Improving hydration of care home residents by addressing institutional barriers to fluid consumption – an improvement project.

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Abstract

Background: Older people are at risk of dehydration due to a wide range of age-related physiological changes. Additional conditions such as dementia or physical frailty may contribute to low fluid intakes and further predispose to dehydration. Care home residents are more likely to be admitted to hospital with dehydration, but there few recent studies that evaluated the amount of fluids that residents consume or the barriers to hydration that they experience.

Objectives: To assess current hydration care in nursing homes, identify barriers to drinking adequate amounts and develop strategies to optimise fluid intakes in the older care home residents.

Method: This study was conducted in one care home in London, which provides care to a multi-ethnic population of the residents. Focus groups conducted in preparatory phase investigated factors necessary to provide adequate hydration care. Exploratory phase used observations, focus groups and interviews to determine how drinks are currently provided and to explore attitudes of staff and residents towards hydration care. The intervention phase used Model for Improvement framework to identify and test strategies to improve hydration for the residents.

Results: Observations revealed that most residents consumed less than the recommended minimum of 1500ml of fluids. Hydration not seen as a priority resulted in several barriers that hindered staff ability to serve adequate amounts of fluids, and residents' enjoyment and ability to consume them. Interventions were designed to overcome these issues and included: training, increasing the number of drink opportunities, improving preference compliance and introduction of a new drinking equipment. During the testing, most interventions resulted in the residents consuming more fluids, but sustaining these interventions was difficult. Barriers to sustainability included poor leadership and task-oriented work culture.

Conclusions: This study demonstrated that fluid intakes in care home residents are suboptimal. This is mostly due to insufficient number of opportunities for the residents to obtain drinks as well as not receiving adequate assistance and preferred drinks. Implementation of the interventions which address these barriers increases fluid intakes. Care homes need to implement appropriate strategies, but this requires

organisational commitment with support from senior managers and strong leadership at operational level.

Key words:

Care homes, dehydration, fluid intakes, improvement science, older people

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Definition of terms used in this thesis

Care home: this is an umbrella term that describes nursing and residential homes. Other terms used outside UK include long-term facility and veteran's home. In this thesis a term 'care home' is used, except when discussing results of other studies.

Dehydration/underhydration: these terms are often used interchangeably to define the state of insufficient volume of water in the body. The term 'dehydration' is used clinically where the subject is formally assessed by validated tools. In this thesis, formal assessment was not conducted, hence the term 'underhydration' has been used.

Healthcare professional: refers to a person working in healthcare services. In this thesis this particularly concerns external healthcare professionals including allied health professionals such as dieticians, doctors and pharmacists.

Hydration care: for this thesis this is defined as any part of the care that helps residents consume fluids. This may include drink provision, assistance or asking if residents would like a drink.

Older person: concerns a person of 65 years or older. Other terms used in literature include terms: 'old', 'elderly', 'elder', 'geriatric' and 'senior citizen'. In this thesis, a term 'older person' is used.

Personal care: usually refers to any type of care that satisfies physiological needs of the person. In this thesis, the term includes any care except care related to eating and drinking.

Underhydration/dehydration: these terms are often used interchangeably to define the state of insufficient volume of water in the body. The term 'dehydration' is used clinically where the subject is formally assessed by validated tools. In this thesis, formal assessment was not conducted, hence the term 'underhydration' has been used.

List of abbreviations

AC – Activity Coordinator

ADH – Antidiuretic Hormone

AED – Action-Effect Diagram

AKI – Acute Kidney Injury

ANP – Atrial Natriuretic Peptide

BIA – Bioelectrical Impedance Analysis

CF – Contributory Factor

CIHR – Canadian Institutes of Health Research

CH – Care Home

CKD – Chronic Kidney Disease

CLAHRC – Collaboration for Leadership in Applied Health Research and Care

CQC – Care Quality Commission

DBS – Disclosure and Barring Service

ECV – Extracellular Volume

GP – General Practitioner

HCA – Healthcare Assistant

HK - Housekeeper

HLE – Hydration Linked Event

ICV – Intracellular Volume

ITF – Interstitial Fluid

IVF – Intravascular Fluid

KT – Knowledge Translation

MUST – Malnutrition Universal Screening Tool

NHS – National Health Service

ONS – Oral Nutritional Supplement

PCV – Packed Cell Volume

PDSA – Plan-Do-Study-Act cycles

PDT – Protected Drinks Time

RCT – Randomised Controlled Trial

RN – Registered Nurse

SALT – Speech and Language Therapist

SPC – Statistical Process Control

TBW – Total Body Water

UK – United Kingdom

USA – United States of America

UTI – Urinary Tract Infection

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Chapter 1. Introduction to the research

This thesis explores the issue of hydration in older care home residents. By taking a pragmatic approach, this research aimed to understand which barriers prevent older people residing in care homes from drinking, and to test the strategies which were designed to overcome these barriers to optimise hydration of this vulnerable population.

Dehydration in older people is common and occurs more frequently in care home residents than the older people in community (Wolff et al, 2015). It is a precipitating risk factor for increased morbidity, mortality and hospital admissions and therefore imposes avoidable financial burden on healthcare providers such as National Health Service (NHS). Dehydration is difficult to diagnose because signs and symptoms are often subtle and unspecific. By the time dehydration is suspected, it is often at severe stage and other comorbidities are usually present. Hence preventing dehydration should be a principal approach to ensure the health and wellbeing of the residents. However, there are currently no guidelines for care home sector to direct the homes on provision of appropriate hydration care.

Physiological changes associated with aging predispose older people to dehydration (Begum and Johnson, 2010). Poor physical and cognitive function can further hinder their ability to drink and they may require additional support to consume their fluids (Luckey and Parsa, 2003; Schols et al, 2009). Currently, a commonly held view maintains that hydrating older people in care homes is difficult because they experience diminished sensation of thirst and subsequently consume inadequate amounts of fluids (Begum and Johnson, 2020; Hooper, 2016). Few interventions have been described where seemingly simple strategies were introduced and successfully improved hydration status of the care home residents (Spangler et al, 1984; Simmons et al, 2001; Robinson and Rosher, 2002; Mentes and Culp, 2003). These studies provided evidence that optimising hydration in the older care home residents was possible, but issues of sustainability made these interventions unfeasible for implementing into practice.

This thesis challenges the opinion expressed by experts that residents refuse to drink. By employing a pragmatic approach, this research provided the evidence that

current daily routines in care homes focus on personal hygiene and therefore contribute to residents' low fluid intakes. Results obtained from participant observations, showed that hydration care was not adequate to meet the needs and preferences of the residents, while the results of the focus groups also demonstrated that staff were not aware how little fluid they provided to the residents. By using Implementation Science methodology, a second part of this research intended to address the problem of hydration, co-designing and testing feasible solutions that could be implemented in any care home affected by this issue. The results demonstrated that increasing fluid intakes was possible, but required strong leadership, teamwork and supportive environment to achieve sustainable change.

1.1 Research question, aims and objectives

The research question of this thesis was:

> *Can hydration of older care home residents be optimised by determining and addressing barriers that prevent them from drinking?*

The aim of this thesis was to assess current hydration care in nursing homes, identify barriers to drinking adequate amounts and develop strategies to optimise fluid intakes in the older care home residents.

The literature review (described in more detail in Chapter 2) identified gaps in knowledge that needed to be addressed to achieve the aim of the thesis. These gaps underpinned the rationale for the exploratory phase of this thesis and were addressed by the following objectives:

Objective 1: To explore the staff and resident perceptions of hydration care and establish what barriers they face in providing hydration and consuming adequate fluids respectively

Objective 2: To map the patterns of current fluid provision and identify interventions to optimise fluid intakes in the residents

Objective 3: To test identified strategies for effectiveness and feasibility using Implementation Science methodology

1.2 Value of research

This research has a potential to improve health and quality of life of the older people residing in the care homes. Therefore, the results of this research provide implications for the care home managers/owners, care commissioners and the bodies, who either provide or regulate the quality of care provided in this setting. Preventing dehydration and its associated morbidity can also reduce the costs of treatment and hospitalisation, an important outcome for healthcare organisations such as NHS.

1.3 Thesis overview

The research presented in this thesis is arranged in the following order:

Chapter 2 provides literature review related to this research. It describes what is currently known about the amounts of fluids consumed by older people and the rates of dehydration in this population. It further discusses the mechanism of water homeostasis, consequences of inappropriate fluid balance and the age-related changes that predispose older people to dehydration. It also provides the detailed description of assessment methods for hydration status and argues why none of them are adequate. The chapter concludes with description of the available intervention studies that intended to improve hydration in the residents.

Chapter 3 presents the theoretical framework for conducting research using the Model for Improvement framework and describes methods used to conduct and analyse all work included in this thesis.

Chapters 4, and 5 present the results of the exploratory phase of the study, with each chapter highlighting the key findings that influenced decision of progression into the next phase of the research.

Chapter 6 provides the description of the intervention phase of the study. This chapter was written using SQUIRE reporting guidelines.

Chapter 7 describes the evaluation phase of this research, which intended to determine the effect the tested interventions on fluid intakes and health outcomes of the residents.

Chapter 8 provides an overall discussion of the research included in this thesis. It discusses the reasons for current barriers to hydration care and gives suggestions for the care homes' policies to overcome these barriers. The chapter also provides the discussion to this work's limitations, as well as implications for future research.

Chapter 2. Literature review

This chapter provides a detailed review of the literature in relation to hydration in older people, with focus on care home residents. It first outlines the importance of maintaining water homeostasis, describes disorders arising from fluid deficit, and provides reasons for inadequate fluid intakes in older people. Further literature review proposes that identification of dehydration in early stages is challenging and that ensuring adequate intakes is the only strategy to prevent the associated morbidity. The chapter concludes with the discussion of the problem of hydration in a care home setting and describes the intervention studies that aimed to address this issue up to date.

2.1 Water functions in the body

Human body is mostly made of water. In euhydrated healthy person the water content can reach as much as 73% of the body mass in new-borns (Guyton, 1976), and naturally decreases with age reaching 65% in young adults and as little as 45% in the older people (Sheehy *et al*, 1999).

Water plays an important part in maintaining homeostatic processes within the body. Intravascular fluid (IVC) is needed for metabolic processes within the cells (Iggulden, 1999) while extravascular fluid (ECV) is involved in transport of waste and nutrients, exchange of gasses and providing a suspending medium for the cells (Raman *et al,* 2004). Water is also important in joint lubrication (Zembrzuski, 1997), regulation of body temperature (Raman *et al*, 2004) and nerve conduction (Shanholtzer and Patterson, 2003).

2.2 Disturbances of water homeostasis in older people

Older people are a particularly vulnerable and are predisposed to the risk of water and electrolyte imbalances. Many physiological changes that could affect fluid imbalance have been observed in apparently healthy older subjects. The problem may be further complicated by underlying disease that may accelerate the fluid losses or prevent individuals from obtaining fluids in amounts sufficient to restore water balance.

These sections discuss age related disturbances in water homeostasis. A detailed description of physiology of water homeostasis is described in Appendix 1.

2.2.1 Changes in kidney function

Human kidneys usually start deteriorating at the age of 30, which can result in up to 30-50% of the nephron loss (Begum and Johnson, 2010). The remaining nephrons perform less sufficiently, and their rate of filtration decreases by 10% every decade (Sheehy *et al*, 1999). These changes directly impact the ability to reabsorb solutes and water, resulting in insufficient urine concentration and excessive water and sodium loss (Rolls *et al*, 1990).

2.2.2 Hormonal changes

The diminished kidney results in a decrease in renin production. Renin has an important role of converting angiotensinogen into its active form, angiotensin. Consequently, both angiotensin and aldosterone levels are diminished (Erkert, 1988). Older people have also been found to have increased levels of antidiuretic hormone (ADH), although renal sensitivity to ADH seems to be impaired (Phillips *et al*, 1984). Additionally, there seems to be less ADH produced at night, which results in large amounts of urine production at this time (Asplund, 2004). Therefore, many older people feel more thirst at night, but avoid drinking to avoid toileting or incontinence (Donahue and Lowenthal, 1997; Rittig *et al*, 1989; Asplund, 1992). However, this action has no effect on amount of urine produced (Asplund, 1991) hence they may unnecessarily put themselves at risk of dehydration.

2.2.3 Diminished thirst

Ability to restore water balance and the perception of thirst in the apparently healthy older people are diminished. A series of experiments showed that older people experience less thirst and subsequently drink smaller amounts of fluids than the younger controls (Phillips *et al*, 1984; Crowe *et al*, 1987; Miescher and Fortney, 1989; Phillips *et al*, 1991). The mechanism of depressed thirst sensation is still unknown but is most likely to occur due to changes in central nervous system and possibly due to changes in receptors also associated with taste alterations (Rolls, 1990).

2.2.4 Changes in body composition

Ageing is also associated with changes in body composition. A normal trend observed is an increase in body weight and fat mass, following the decrease in weight and fat-free mass at the older age (Going *et al*, 1995), although these alterations occur even if the weight remains stable (St-Onge and Gallagher, 2010).

Hence with time, the proportion of fat-free mass decreases while fat mass increases even in the healthy older subjects. The amount of water in muscle cells is much higher (Armstrong, 2005) to support metabolic processes, therefore increased proportion of fat mass results in decline in total body water by as much as 4-6 litres by the age of 80 (Gille, 2010). As a result, in the state of fluid deprivation, the aging body has fewer water reserves and is more likely to become dehydrated.

2.2.5 Other disabilities that impair fluid intakes and homeostasis

The apparent deterioration of homeostatic mechanisms may also be complicated by disease, polypharmacy and cognitive impairment often associated with aging. Some conditions such as Alzheimer's disease or diabetes increase fluid loss (Miller, 1997; Luckey and Parsa, 2003; Chiasson *et al*, 2003). Other diseases such as kidney or heart failure may require fluid restriction (Ferry *et al*, 2005; Thomas *et al*, 2008; Perren *et al*, 2011). Additionally, many conditions associated with older age result in swallowing difficulties, visual impairment and decline of physical or cognitive status, which may also influence the ability to obtain the fluids and predispose to dehydration (Schols *et al*, 2009).

2.3 Fluid requirements and intakes in older people

It has been estimated that a healthy human body loses about 2500ml of water via urine each day (Ferry *et al,* 2005), further unavoidable losses also occur via faeces, sweat, respiration and evaporation through the skin (Scales and Pilsworth, 2008). This amount must be replenished daily to prevent adverse events. Most water is obtained from foods and fluids consumed, but small amount is also produced from metabolism (Guyton, 1976). However, water requirements vary between individual people depending on personal characteristics such as the size of the person, the amount and quality of food consumed as well as activity level. Different methods for calculating individual fluid requirements exist based on a person's weight, body surface area, the number of calories or amount of protein consumed (Zeman, 1991), but these are time consuming and sometimes complex to calculate and therefore not suitable for general use. They also fail to take other factors such as ambient temperature and the acute disease state into account.

Experts have attempted to establish the minimum amount of fluids to be consumed daily for maintaining health. Different recommendations exist, but most agree on

1500ml as an absolute minimum (Kayser-Jones *et al*, 1999; Ferry *et al*, 2005). There is no evidence suggesting that the requirement for fluids changes with age, therefore same amounts are recommended for older adults (Benelam and Wyness, 2010).

While the evidence suggests that older people should drink the same amounts as the rest of the population, studies often report that the intakes are much less than those recommended. Only one study reported that free living older people can consume adequate fluid intakes if they have access to variety of beverages (Chernoff, 1994). Another study, which assessed fluid intakes in the older free-living subjects in European countries showed that the intakes varied greatly between the countries, but many consumed less than 1700ml/day (Haveman-Nies *et al*, 1997). It was also observed that females had lower fluid intakes than males and in some countries as many as 50-70% women did not drink the recommended amount. Ferry *et al* (2005) also stated that some community dwelling older people consumed less than 3 glasses of fluid per day. The earliest study documenting insufficient fluid intakes was undertaken by Norton *et al* (1963), who reported that of 18 older patients observed in geriatric unit in English hospital only one met the minimum of 1500ml. Similar results were obtained in the study that evaluated fluid intakes of the US care home residents. The author noted that only three out of 67 residents met 100% of their individual target based on recommendation of 1600ml/m^2 of the body surface area, and that the fluid intakes varied greatly between 833ml and 2863ml/day (Gaspar, 1988). Another study reported that non-institutionalised older people had significantly higher fluid intakes (2115ml) than those residing in care homes (1507ml/day) (Adams, 1988). These figures seem relatively high to those observed in other studies. One explanation for this may be that the subjects were less functionally dependent and with high cognitive status and were reported to be eager to participate in the study, and that the intakes were reported by the subjects themselves. Other research from care homes reported daily fluid intake in nursing home residents to be 897ml/day (Kayser-Jones *et al*, 1999). Authors reported that majority of the fluids were consumed at mealtimes and that although average fluids offered with meals were 1200ml, only 610ml was consumed. Authors reported only one resident who consumed more than 1500ml of fluids. Another study, which compared fluid intakes in patients from three different geriatric units (acute, psychogeriatric and long term), observed that the fluid intakes were similar and

averaged just above 1000ml for all (Armstrong-Esther *et al*, 1996). The highest fluid intake observed in this study was only 1607ml.

2.4 Consequences of insufficient fluid intakes

This section will discuss different health effects associated with dehydration and/or consuming insufficient amounts of fluid either acutely or chronically.

2.4.1 Dehydration

Dehydration in clinical setting is commonly described as a decline of total body water, which may or may not be accompanied by electrolyte losses. Reduced fluid intakes result in an increased concentration of electrolytes and development of hypertonic dehydration (Thomas *et al*, 2008). The hallmark of hypertonic dehydration is a thirst sensation resulting from a high concentration of electrolytes (Mange *et al*, 1997), although this mechanism is diminished in older people. In clinical setting with patients of all ages, dehydration usually develops as a result of acute illness or poorly managed medication and is not usually associated with lack of access to fluids (Thomas *et al*, 2008). However, in older people, acute illness often exacerbates pre-existing chronic underhydration, which was previously overlooked (Bennett *et al*, 2004). For some older people water deficits are so great that they suffer from severe dehydration in the absence of acute events. This type of dehydration is sometimes viewed as an indicator of neglect (Himmelstein *et al*, 1983; Hodgkinson *et al*, 2003; Campbell, 2011).

Dehydration is common in the older population. Early reports estimated the frequency of dehydration as 2.25% of all admissions to hospital in the United States of America (USA) (Himmelstein *et al*, 1983) and hypernatraemia as 1.1% of all admissions (Snyder *et al*, 1987). Warren *et al* (1994) reported this to be 6.7% just a decade later. In recent study assessing older subjects admitted to hospital in the UK, the prevalence of hypernatraemia was 12% in the care home residents and 1.3% in older people living in their own homes (Wolff *et al*, 2015). Another UK study, which screened 200 older subjects admitted to hospital for dehydration (El-Sharkawy *et al*, 2015) reported that as many as 37% of the subjects had blood osmolality indicating hyperosmolar dehydration, but only 8% patients had a clinical diagnosis of dehydration. This study demonstrates that dehydration may be much more common than previously thought and that clinical data may not be reliable. The fact that

dehydration is under-recognized amongst hospitalized older subjects has been recognised previously (Vivanti *et al*, 2008). Another study reported that 20% of older patients admitted to hospital displayed symptoms of dehydration (Wallace and Schwartz, 1997); while Mentes *et al* (1999) reported the prevalence to be 33% for those in long term healthcare facilities. Dehydration is also one of the most common reasons older people come to emergency department (Gross *et al*, 1992).

2.4.2 Disorders of urinary tract

Dehydration is often cited as a risk factor for urinary tract infections (UTI), although the definitive relationship between these two conditions has not been established (Beetz, 2003). Additionally, UTI itself can precipitate dehydration due to presence of fever, sweating and confusion, which could accelerate fluid loss or reduce fluid intakes (Arinzon *et al*, 2005; Matthews and Lancaster, 2011). A few epidemiological studies provide the evidence of the link between fluid intakes and UTI, although most of these studies focused on younger populations and results were confounded by other factors such as poor toileting habits (Wang, *et al,* 2002; Mazzola *et al*, 2003; Stauffer *et al*, 2004; Rudaitis *et al*, 2009). Only two studies focused on reducing UTI in older care home residents. One small randomised controlled trial (RCT) conducted in nursing homes reported a reduction in the incidence of UTI (Mentes and Culp, 2003), while a small before-after study in similar setting reported no significant change (Robinson and Rosher, 2002).

Chronic underhydration, insufficient fluid intakes or decreased urine volume have demonstrated a link between other conditions of urinary tract including kidney stones (Borghi *et al,* 1996; Manz and Wenz, 2005), bladder cancer (Altieri *et al*; Zeegers *et al*, 2004; Manz and Wenz, 2005; Lotan *et al*, 2013), Chronic Kidney Disease (Hebert *et al*, 2003; Torres, 2009; Strippoli *et al*, 2011; Clark *et al*, 2011) and Acute Kidney Injury (Badr and Ichikawa, 1988; Stewart *et al*, 2009; Basile *et al*, 2012). However, these studies were conducted in populations not limited to older people.

2.4.3 Respiratory tract infections

Respiratory tract infections are common in care homes and often precipitate hospital admissions (Kruse *et al*, 2004). Many of these are also common in subjects diagnosed with dehydration. One study reported that of 23 older patients with dehydration, seventeen presented with at least one infection, and 12 of these were

pneumonia (Mahowald and Himmelstein, 1981). A similar study by the same team revealed that 82% of older patients with dehydration had concomitant infection and more than a half of them had pneumonia (Himmelstein *et al*, 1983). Same trends were observed by Warren *et al* (1994) who reported 28.2% prevalence of respiratory infection in the dehydrated older patients. Neither of the authors attempted to identify whether dehydration or infections developed first. Another study also suggested that fluid intake may increase the risk of death due to lower respiratory tract infections in the nursing home residents regardless of antibiotic use (Szafara *et al*, 2012). Furthermore, in the study of tube-fed patients with persistent vegetative state it was observed that low fluid intake was a significant risk factor for development of pneumonia (Lin *et al* 2007). It therefore seems likely that dehydration is a possible precipitant to respiratory infections and further influences the risk of mortality, especially in vulnerable populations.

2.4.4 Delirium and disorders of central nervous system

It is generally accepted that dehydration is a risk factor for delirium (Thomas *et al*, 2008). It has been estimated that small changes to central nervous system, often unnoticeable to untrained eye appear with 1% of fluid loss and become more evident at 5% (Lieberman, 2007). These effects may be more pronounced in those with poor regulation of fluid balance such as children and older populations (Masento *et al*, 2014); although some argue that the link between delirium and dehydration in older people is still elusive (George and Rockwood, 2004). Delirium is a syndrome, commonly precipitated by more than one factor and sometimes influencing fluid intake (George and Rockwood 2004). Studies reported that inadequate fluid intakes were associated with acute confusion in older residents of the long-term facilities (Mentes *et al*, 1999) and that those who drunk at least four 8oz (about 225ml) glasses of water were less likely to develop acute confusion than those who consumed less than this amount (Culp *et al*, 1997). Voyer *et al* (2009) reported similar findings and concluded that insufficient fluid intake and subsequent dehydration is an independent risk factor for development of delirium in the older people in long term care facilities. However, it has been reported that changes in consciousness often remain undiagnosed, especially those of hypoactive state or when subject has been previously diagnosed with dementia (Voyer *et al*, 2007).

2.4.5 Constipation

Water adds bulk to faeces and may therefore decrease transit time for excretion. Increasing fluid intakes is often a recommended first line treatment for constipation (Popkin *et al*, 2010). Decreased fluid intakes were associated with increased constipation in the older care home residents (Robson *et al*, 2000) but not in the free living community dwelling older people (Lindeman *et al*, 2000). However, increasing fluid intakes may only prevent constipation in those in hypohydrated state. For those with chronic constipation and sufficient intakes, increasing fluids has no benefit (Manz and Wenz, 2005; Manz, 2007; Popkin *et al*, 2010).

2.4.6 Falls

Severe hypertonic dehydration may cause hypotension, but a less severe isotonic water loss may have a similar effect. Dehydration may be a reason for hypotension, which itself is a reason for falls (Niemann, 2001), however dehydration may cause other problems such as confusion and muscle weakness, which could be precipitants for falls as well. These three risk factors were significantly associated with risk of falls in older cancer patients (Boler *et al*, 2007), but this association has not been established in other older populations.

Few interventions showed that increasing fluid intakes may positively influence the incidence of falls in older populations. In a small before-after study of 51 nursing home residents, the incidence of falls reduced significantly (Robinson and Rosher, 2002). Anglian Water project (2009), conducted in two care homes also reported that one of the homes achieved 50% reduction of falls, but this was based on anecdotal evidence provided by staff during the interviews and no attempt was made to measure any of the health-related outcomes.

2.4.7 Death

There is a substantial evidence suggesting that dehydration increases the risk of death in the older people, and the mortality may be as high as 40-70% (Kayser-Jones *et al*, 1999). A recent study evaluating outcomes of 200 older people admitted to hospital reported that out of 14 participants who died in hospital, 11 (79%) were dehydrated at admission. Dehydrated older patients were six times more likely to die in hospital (El-Sharkawy *et al*, 2015). The risk seems to have a long-term effect, as the same study showed that 30-day mortality in dehydrated patients was significantly higher, while another study showed the elevated risk persisted 180 days after the

discharge (Wakefield *et al*, 2009). Warren *et al* (1994) demonstrated that almost 50% of the older people died within a year of being diagnosed with dehydration and almost 20% did so within 30 days of admission.

Concomitant diseases also increase mortality rate. Mahowald and Himmelstein (1981) reported that the degree of dehydration was not related to mortality rates, but the presence of infection increased a risk of death. Similar findings were observed by another study where 82% of residents who died due to febrile illness also had underlying hypernatraemia suggesting severe dehydration (Arinzon *et al*, 2005).

2.4.8 Challenges linking dehydration with health conditions

Conducting research linking hydration and other diseases poses a lot of difficulties. Currently, most of the studies are observational in nature and therefore lacking rigour of good quality Randomised Controlled Trials (RCT). On the other hand, conducting well designed RCTs or even observational cohort studies would require at least a proportion of the participants to remain dehydrated. This approach would be unethical, but alternatives limit the options available for research.

Arguably, one of the biggest challenges of establishing the relationship between hydration and the health outcomes is the elusive aetiology of the diseases. Many conditions described above are multifactorial and not necessarily associated with fluid intakes. By the time dehydration is diagnosed, it is frequently present with concomitant conditions and it is not easy to establish which developed first. Another factor is a lack of appropriate measures for hydration status (described in Section 2.6). Many experts believe that there is no gold standard to measuring hydration status (Shirreffs and Maughan, 1998; Kavouras, 2002; Manz and Wenz, 2003; Armstrong, 2007). This poses a dilemma that if hydration status cannot be assessed reliably, associating it with any disease would be even more challenging.

2.5 Measuring hydration status in older people

Measuring hydration status is challenging because of complex dynamics associated with fluid regulation. Water balance is a continuous process of water losses from kidneys, lungs and skin and occasional uptake through oral intakes. Many assessment methods exist, and these were established for different purposes and circumstances such as clinical, academic or industrial settings. There have been

numerous attempts to establish the most reliable assessment method that could be used for different settings and for different population groups (Shirreffs and Maughan, 1998; Oppliger and Bartok, 2002; Kavouras, 2002; Shirreffs, 2003; Manz and Wenz, 2003, Cheuvront and Sawka, 2005; Armstrong, 2005), but so far the superiority of any one of these has not been established (Armstrong, 2007).

This section describes the assessment methods which may be potentially useful for identifying underhydration in care home setting. A full description of the assessment methods is provided in Appendix 2.

2.5.1 Bioelectrical Impedance Analysis (BIA)

This method estimates the amount of body water by assessing a conduction of an electrical current sent through the body. The technique has been widely used in the nutrition field to estimate body composition (Shanholzer and Patterson, 2003). It utilizes a mild electrical current that travels between electrodes placed on hands and feet, where resistance of its flow is measured. The higher resistance is expected in the less conductive tissues such as fat, and less resistance in tissues where the current travels easily, e.g. blood and muscles. The obtained resistance is used to calculate water volume.

The technique is cheap, non-invasive and widely available across different settings, but it is not reliable to detect the changes smaller than 1000ml. It has also been shown to be affected by some physiological factors such as dehydration or sweating (NIH, 1994; Armstrong, 2007). The technique however may be more reliable in monitoring the changes in hydration status if used repeatedly on the same individuals in short time intervals (Armstrong, 2007).

2.5.2 Changes in body weight

Daily fluctuations in body weight are almost exclusively attributed to the changes in hydration status because the body has limited ability to utilise adipose tissue for energy (Whitney and Rolfes, 2002). Therefore, day to day change in weight is directly proportional to the amount of water gained or lost. Since one litre equals one kilogram of water, quick calculation of the amount or proportion of TBW changes can be calculated and may provide a quick assessment of hydration status (Dimant, 2001; Nightingale and Woodward, 2006; Lunn and Foxen, 2008). Severe dehydration should be considered if the body weight rapidly decreases by 3%

(Hodgkinson *et al*, 2003). However, this method is only reliable for short periods of time during which the potential amount of adipose tissue loss would be insignificant (Armstrong, 2007). Since the body weight is also immediately influenced by the weight of foods consumed, this assessment method needs to ensure that the measurements are taken at the same times during the day, preferably after the first urine voiding and before breakfast, and wearing as little clothing as possible. This method also relies on adequately calibrated equipment, especially if more than one scale is in use. Another limitation for care home setting would be the time consumption required to weigh all residents every day.

2.5.3 Haematological Indices

Many haematological parameters have been used to describe hydration status. Since they are relatively easy to obtain, and require equipment and expertise widely available in hospitals, these are often used in clinical setting. Different haematological indices have been described in relation to hydration and include plasma osmolality, concentration of sodium, urea or albumin and the packed cell volume.

One of the greatest limitations of haematological indices is their little usability to detect a mild or impending dehydration. This method may be reliable for severe hypertonic dehydration, where reduced fluid volume would result in high concentration of other blood components. However, since the body relies on adequate blood flow to allow for delivery of nutrients and removal of waste products, the body draws fluid from other organs to maintain the vascular tree (Thomas *et al*, 2008). Hence haemoconcentration may not be apparent until dehydration is severe. Additionally, if water losses were accompanied by the losses of the salt, this assessment method would not be reliable.

This method of assessment requires trained professionals to perform venepuncture and draw a blood sample; a technique that is seldom used in care home settings. In chronic dehydration, haematological values may climb very slowly as hydration deteriorates, therefore this method of assessment could be used in care homes to monitor residents over long periods of time if routine tests were possible to be performed in this setting (Zembrzuski, 1997).

2.5.4 Urinary Indices

The amount of urine excretion is roughly proportional to the amount of fluid consumed (Armstrong, 2007). In healthy subjects, diluted and concentrated urine is expected with increased and decreased water intakes respectively. This assumption is considered when assessing hydration status using urine parameters, such as urine osmolality, specific gravity or colour. Urine osmolality requires specialist equipment, which is not available in care homes. Dipsticks, which measure specific gravity are easily obtainable, but these are less precise and can be affected by certain disease states as well as the temperature of the environment. Urine colour can also be used, and the urine chart has been developed to aid the assessment of hydration status (Armstrong, 20017). One study that evaluated urine colour chart in nursing home residents concluded that this assessment method may be accurate. Since the toileting is a major component of care delivered in care homes, this should also be easy to use (Mentes *et al,* 2006). However, there may be many confounding factors that limit the usefulness of this method, as certain medications (e.g. B vitamins) and foods could influence the urine colour. Authors recommended obtaining a few baseline readings of urine for each resident, and when possible taking the urine specimens from the first or second voiding of the day. The authors also reported difficulty in obtaining the specimens from incontinent residents; the limitation that was also described in the study by Rowat *et al* (2011) who reported that despite great efforts to obtain urine from incontinent stroke patients (e.g. squeezing out pads and bedding), many samples were lost.

Additionally, an assumption that the volume and concentration of urine is proportional to the amount ingested may not always be correct, because upon ingestion of large bulk of fluid, the body will attempt to excrete the water overload to reduce the chance of overhydration, even if the body is dehydrated (Armstrong, 2007).

2.5.7 Clinical signs and symptoms

Many signs and symptoms are used in clinical settings to identify people with dehydration. Since they require no equipment and little time, these can be performed routinely in any setting especially since no specialist skills are required. They provide additional benefit of being less invasive than other assessment methods. Commonly used signs and symptoms are provided in Table 2.1.

Table 2.1 Signs and symptoms commonly used to assess hydration status

System affected	Signs and symptoms	Limitations
	Thirst	May be absent or person may not be able to communicate it
Changes in nervous system	Confusion, headache, lethargy, speech difficulty	Often unrecognised or mistaken for symptoms of dementia
Decreased production of bodily fluids	Dry oral mucosa, dry tongue, tongue furrows, small saliva pool,	Medical conditions, medications and breathing through the mouth may result in similar symptoms
Skin	Reduction of axillary sweat, reduced skin turgor (thigh, forearm, clavicle, sternum), sunken eyes	Skin turgor reduced in older people
Cardiovascular system	Tachycardia, hypotension, postural hypotension, decreased capillary refill	Can be affected by other medical conditions
Muscular system	Muscle weakness	Common in older people, even in well hydrated

Physiological and physical signs and symptoms usually have very poor sensitivity and specificity (McGee *et al*, 1999; Thomas *et al*, 2008) and differ between the age groups (Ferry, *et al* 2005; Smith, 2007; Rikkert *et al*, 2009). While clinical signs and symptoms may not be a reliable method to assess hydration status, they may be to suspect water and electrolyte disturbances and prompt clinical investigations for confirmation (Vivanti *et al*, 2008). These could be used for monitoring in conjunction with a series of biochemical data to assess deterioration of hydration status (Zembrzuski, 1997). The greatest limitation associated with assessment of signs and symptoms is that most are subjective and there are usually no ‘normal’ ranges associated with them. They may also be associated with other diseases or normal physiological states.

2.5.8 Fluid charts

Fluid charts capture fluid intakes of the individuals. These are mostly used in settings where hydration care is provided by healthcare workers and are usually applied to the individuals recognised to be at risk of underhydration.

Fluid intakes have also been reported to be inaccurately measured (Callum *et al*, 1999; Mentes, 2006a). Fluid intake measurements are usually imprecise because it takes a great amount of time and commitment of all people involved in fluid provision; these include the subjects themselves, nurses and nursing assistants and often the housekeeping staff and family. One study reported that nurses did not

know the volumes of the standard cup or glass (Armstrong-Esther *et al,* 1996) while another showed that staff tended to guess the amounts consumed and often assumed that empty contents meant consumption of the entire drink (Iggulden, 1999). Similar findings were confirmed by Simmons *et al* (2001) who reported that the food and fluid intakes in nursing home residents were significantly over reported. This is in line with another study performed by Jimoh *et al* (2015) who found no correlation between observed and documented fluid intakes in residential care homes and demonstrated a potential of some residents to complete their own drink diaries. Armstrong-Esther *et al* (1996) also reported that the staff did not think the fluid balance charts were useful in assessing hydration status as they thought they were inaccurate. It is unlikely that the staff would take time to fill the charts appropriately if they believed they were not a reliable tool. While fluid charts have a potential to monitor hydration status; they need a careful consideration of the above limitations. These charts also need to be reviewed regularly if they are to be reliable in identifying people at risk of dehydration; and this task has been often found neglected due to time constraints (Watkins *et al*, 1997; Callum *et al*, 1999).

2.5.9 Challenges to measuring hydration status

As of now, there are no reliable tools to determine hydration status. From physiological point of view, direct measurement of fluid compartments may be the only reliable method, but it is time consuming, costly and unsafe (Armstrong, 2007). Clinically, dehydration is often diagnosed based on haematological and urinary markers supported by physical signs and symptoms (Thomas *et al*, 2003). The question remains if these are appropriate tools. A recent diagnostic review comparing non-invasive methods of fluid assessment status in older people concluded that neither was reliable when compared to serum osmolality (Hooper *et al*, 2015). However, Armstrong (2007) argues that blood indices do not reflect changes in fluid status either, and that urine markers may be more suitable. It may be so that different markers may be more appropriate for different cohorts of subjects as they reflect different types of dehydration.

Dehydration may appear in a course of days or even hours and a person may quickly develop subsequent life-threatening conditions. The condition is often overlooked in a picture of other issues, often seen by healthcare workers as more important than fundamental need of hydration care. In the light of the evidence that

hydration status is not easy to assess, this part of care needs to be taken more seriously and appropriate action prevent dehydration is required. Preventing dehydration should to be particularly important in settings caring for vulnerable populations such as older people residing in care homes.

2.6 Challenges to providing hydration in care homes

Fluid intakes in nursing home residents were found to be inadequate in a few studies (Hart and Adamek, 1984; Gaspar, 1988; Adams, 1988; Armstrong-Ester *et al*, 1996; Kayser-Jones *et al*, 1999). Some reported that up to 99% of the residents were not meeting the minimum recommended amount of 1500ml (Kayser-Jones *et al*, 1999) and most residents were consuming less than 1000ml (Robinson and Rosher, 2002). Kayser-Jones *et al* (1999) reported the mean fluid intake was 897ml/day and that 62.5% residents displayed conditions that could be related by dehydration.

A small observational study performed by Armstrong-Esther *et al* (1994) in psycho-geriatric, long-term-care and geriatric admission units, it was evident that the nurses did not have sufficient knowledge to appreciate the importance of hydration care. Consequently, the older people were consuming much less than the amounts recommended and those who consumed the least were dependent, cognitively impaired or incontinent. Similar issues have been observed in care home environment. The most comprehensive picture has been obtained by the series of qualitative studies of US care homes by one team (Kayser-Jones *et al*, 1999 Kayser-Jones, 2002, Kayser-Jones, 2009). During the years of research, the authors reported many failures in basic care of hydration and nutrition leading to a national enquiry and changes in legislature. Many issues were still reported to be unsolved (Kayser-Jones, 2009). The main author stated that the issues contributing to inadequate hydration care were poor training, inadequate staffing and lack of supervision (Kayser-Jones *et al*, 1999). She also highlighted the importance of individual care in maintaining adequate hydration and nutrition status (Kayser-Jones, 2002). As of now there is little epidemiological data on dehydration or fluid intakes in the older people in the UK. Qualitative work on hydration care in UK care homes is also currently lacking, but the concerns have been raised (Szczepura, 2008).

Older people residing in care homes are sicker and older than the rest of the population. It could be argued that care home residents are more difficult to hydrate,

and many will never meet the recommended amount. The difficulty for some residents to obtain fluids has been recognised before. Transition into a nursing home is a life-changing event and many people suffer not only from physical or cognitive disabilities that may restrict fluid intake, but also from depression (Weinberg, 1995). One study also reported that some residents may actively restrict their food and fluid intakes in hope that they would guilt the families to visit more often (Mentes et al, 2006a). These observations prompted another study (Mentes, 2006b), which described seven types of the residents based on their ability and desire to obtain fluids. These roughly fall into three broad categories of those who '*can drink*' but do not obtain enough because of cognitive impairment or because they do not feel thirsty, '*can't drink*' due to physical disability or swallowing difficulties, '*won't drink*' because they fear incontinence or never drunk much and '*end of life*' category. The authors also described the most common characteristics associated with each typology and developed strategies to increase fluid intakes for each type of the resident.

There is substantial amount of evidence suggesting that the care is less than optimal to ensure hydration in care home residents. Some factors identified so far are: little fluid offered between the meals and lack of fluid of choice (Simmons *et al*, 2001), very little water offered with medication (Godfrey *et al*, 2012) and very little time spending helping the residents eat and drinks, especially those with dementia (Hu *et al*, 1986).

2.7 Strategies to increase fluid intakes in care homes

Some studies reported that appropriate fluid management techniques may be a simple and effective way to prevent dehydration as well as associated morbidity in the older population.

Simmons *et al* (2001) reported results of a 32-week study where intervention consisted of prompting between mealtimes. They demonstrated that 78% of residents increased their fluid intakes by receiving prompts during the day, reliable toileting assistance and social gatherings. Further 21% also increased fluid intakes following the introduction of preferred drinks. It was also noted by the authors that the subjects in the latter group were less cognitively impaired. The improvement in hydration status was apparent with accompanying improvement of hydration markers

as well. Research staff actively participated in fluid provision by offering a range of drinks as well as assistance with drinking.

An 8-week randomised controlled study performed in nursing home residents (Mentes and Culp, 2003) has shown that increasing fluid intake influenced infection rates. The strategies, including 180ml fluid intake with medication twice a day and 'tea time' social events twice a week, were successful in preventing hydration-linked urinary and respiratory infections as well as acute confusion. Despite the baseline characteristics of the intervention group to be less favourable than that of the control group, the infection rates were lower in the latter, although not significant. The greatest limitation of this study was a sample size, which did not have enough power for the analysis to be significant. Research staff actively participated in fluid management of the residents as well as in data collection.

A study performed by Robinson and Rosher (2002) concluded that as little as five minutes a day per resident is enough to ensure appropriate hydration care. The strategies included employing trained assistants to distribute a wide choice of drinks that were visually appealing and created memorable experiences. In this study, the fluid intakes have increased, with 53% of the residents meeting the fluid intake goal of 1500ml/day consistently, regardless of cognitive status. The number of residents with TBW lower than normal (as calculated by BIA) has decreased from 47% to 6% during the nine weeks of intervention. The remaining 6% of the residents were reported to have a late stage dementia with severe swallowing impairment. The authors also reported significant increase in bowel movement and decreases in the use of laxatives and incidence of falls. However, it was also reported that hydration status started declining following the completion of the study. The authors reported that the drinks were given by hydration assistant whose sole role was hydrating the residents; they also provided cost analysis of employing such an assistant suggesting that the intervention required additional member of staff to be present.

Another study reported that a simple strategy of providing a choice of fluids frequently together with toileting assistance was effective in improving hydration status as well as reducing urinary incontinence in care home residents (Spangler *et al*, 1984). The intervention consisted of loading a cart with a range of fluids and toileting equipment and visiting each resident’s room at least every 1.5 hour allowing

for at least eleven contact episodes during the waking hours (6am to 9pm). At each contact, the aide offered a drink and toileting assistance. Authors reported significant improvement of hydration status as assessed by urine SG as well as decreased incidence of incontinence. However, it was reported that the intervention was supported by the aides from the research team and that care home staff provided this care independently only for the last ten days of the intervention; although authors stated that four months after the project ended the procedures were still in place and hydration status did not decline (data not provided).

The above evidence suggests that seemingly simple solutions such as increasing frequency of drinks offered, preference compliance and assistance in toileting are effective in supporting hydration care. There appears to be a concern regarding sustainability of such interventions. All studies seemed to rely on employing supernumerary staff to carry out the tasks set by the protocols. This poses an argument whether these interventions can be feasibly implemented in care home setting known to be lacking financial resources. Testing for practicality and acceptability of these interventions in care home environment is therefore necessary.

2.8 Conclusions

Water homeostasis is vital to maintaining optimal health. Older people should consume the same amounts of fluids as recommended for the younger populations, but they experience lack of thirst and their ability to maintain fluid homeostasis is very limited. Therefore, it becomes increasingly difficult for the aged body to maintain the adequate fluid balance. Considering age as well as physical and cognitive impairments are the most important risk factors for dehydration, people residing in care homes are particularly vulnerable. Current methods for fluid assessment in this population are generally not reliable and those that could provide some use are not available in care home setting. Hence there is a need to provide the best possible hydration care to ensure dehydration is prevented. However, evidence suggests that providing this fundamental need is challenging for many care homes. Some strategies to increase fluid intakes in care home residents have been shown effective, but the feasibility of such interventions remains uncertain and therefore research should focus on implementing the best hydration care in practice.

Chapter 3. Methodology

The literature review chapter indicated that older people in care homes do not drink enough. This may be due to the combination of physiological changes associated with age, cognitive and physical disabilities, and insufficient hydration care provided by the care homes. Intervention studies demonstrated that increasing fluid intakes is possible, and that change can be achieved using apparently simple strategies such as increasing opportunities to obtain fluids, preference compliance, and providing assistance with drinking and toileting. One question remains; if these are simple strategies, why are care home residents still dehydrated? The fact that some of these studies reported a problem with sustainability suggests that the reason for this may be that they were never imbedded into the practice. Thus, there is a need to translate this research evidence into practical solutions that can be used in practice routinely.

Changing practice requires a pragmatic approach to determine what works and how. This chapter describes the reasoning for using Implementation Science, which promotes the implementation of research evidence into practice. The chapter is divided into four sections. The first section describes the principles of theoretical approach used in this study. The second section describes the methodology used for collecting and analysing the data and provides the rationale for choosing these methods. Lastly, the third section provides the description of ethical considerations for this research.

3.1 Pragmatic approach to research

Pragmatic paradigm has been used as an epistemological stance in this thesis. A paradigm can be defined as the way one sees and experiences the world and forms beliefs about concepts such as morals and aesthetics (Morgan, 2007). Using the paradigm is beneficial because it helps the researcher determine the course of research. Kuhn (2012) defines the paradigm as a set of theories and practices that define the scientific discipline at a specific period of time. The paradigm therefore helps to define the research questions, choose specific methodology for data collection and analysis, and guides the researcher through the interpretation of the results to reach appropriate conclusions. Paradigm can be simply seen as a set of

beliefs that subsequently guide the researcher's actions (Guba, 1990; Guba and Lincoln, 1994). Traditionally, the two main paradigms in research were positivism and constructivism. Positivism assumes that there is only one truth that can be verified though empirical examination, which resonates with quantitative research in social sciences (Guba, 1990; Feilzer, 2010). The researcher's role in the inquiry is limited to data collection and interpretation through objective approach and the truth is objective and independent of the researcher who conducts it. This requires the researcher to maintain the minimal interaction with the study participants, which may at times be difficult to achieve. Additionally, the obtained results may lack invaluable information as to why the events occur. Furthermore, factors such as time and space are also independent of empirical inquiry and therefore strip the obtained results from the valuable context. As the opposing philosophy in research, constructivism suggests people construct their views of the world based on their experiences and the lessons learnt from them. As such, there is no single, objective truth and that every truth expressed by the person is valid and is context dependent (Morgan, 2007). This fits with qualitative research of the social sciences.

Due to conflicting ontological stances underlying the positivist and constructivist view, there has been a divide between the quantitative and qualitative research, which as a result have been regarded as mutually exclusive (Feilzer, 2010). Subsequently, the qualitative and quantitative research methods were usually practiced from the scholars from different disciplines (Cupchik, 2001). This divide between the paradigm and the resulting separation of the methods has been termed the 'paradigm wars', which arose in the 1970s and 80s when the positivist stance has been criticised by the scientists favouring qualitative research and proposing constructivism as the dominant research paradigm (Tashakkori and Teddlie, 1998; Hall, 2012). However, it has been recognised that the knowledge that arises from both, the quantitative and qualitative data complement each other, and neither should be ignored (Cupchik, 2001). Therefore, there was a need for a new paradigm that would allow both methodological approaches to be used.

Pragmatism is fundamentally linked to both, positivist and constructivist approach. It was born as an alternative that bridges the two paradigms and enables the researchers to combine the qualitative and quantitative approaches (Creswell, 2003; Johnson *et al*, 2007). The primary feature of the pragmatic paradigm is its emphasis

on practicality and usefulness of the ideas and has been viewed as the paradigm to combine the 'best of both worlds' (Giddings, 2006). Pragmatism underpins the mixed methods research and has been used extensively in the last decade, although this has been criticised. Morgan (2007) argued that mixed methods approach did not fully utilise the philosophical bases of the pragmatism and that this stance is only used to allow for using qualitative and quantitative approaches in the research. Morgan further argued that the researchers should not only be concerned with 'what' they, but also 'how' and 'why' they do it. Since the research does not occur in a closed environment, it will always have influence on context and this also needs to be explored.

Pragmatism focuses on the 'practical problems of the real world' (Creswell, 2003; Feilzer, 2010) and is less concerned with the nature of the knowledge itself (Hall, 2012). This paradigm views the knowledge as derived from the reality of the world a person lives in and encompasses not only the knowledge deriving from the past, but also what knowledge can be created in the future (Maxcy, 2003; Johnson and Onwuegbuzie, 2004; Morgan, 2007; Nowell, 2015). Knowledge a person has and how much the person believes this knowledge to be true depends on person's experience and interests (Nowell, 2015). This therefore means that in complex settings, knowing may have different perspectives and as a result, the knowledge may vary between different groups and sometimes may even be contradictory (Morgan, 2010).

Healthcare is an example of a complex setting, where service users, clinicians and managers have different experiences and perspectives of care and their opinions on how this care should be provided differs. Acknowledging all types of truth is the key to understanding a larger, more complex truth, which is a key element of the social interaction within the complex setting (Morgan, 2007 and 2010). Additional benefit of the pragmatic approach is its transferability of the findings into other contexts. As opposed to the quantitative approach, which produces knowledge that is universal but generalised and the qualitative approach, where knowledge is specific but context dependent, the pragmatic approach is concerned with how useful the generated knowledge would be if it was applied to another context (Morgan, 2007).

The review of the literature presented in Chapter 2 demonstrated that the existing interventions have a potential to increase fluid intakes of the older people in care homes. Hence it was apparent that instead of designing a new intervention, there was a need for a more pragmatic approach, which will allow the implementation of the existing evidence into practice. Implementation requires a more pragmatic methodology, which focuses less on efficacy and instead brings better understanding of the research problem and finds workable solutions for the real-world clinical practice.

3.1.1 The need for Knowledge Translation

It is now widely recognised that the knowledge derived from research has a potential to improve care, but only if it is effectively applied in a clinical setting (Pearson *et al,* 2007; Curran *et al*, 2011; Grimshaw *et al,* 2012). Current studies estimate that it takes up to two decades for the research to be incorporated into practice (Sussman *et al*, 2006) and the slow pace of the uptake of the evidence is a concern (Curran *et al*, 2011). While some lag period is necessary to ensure that new technology is safe and effective, there is a need to shorten this time to optimise benefits and reduce waste.

There are two models of implementing research findings into practice, the knowledge transfer and knowledge translation. The traditional knowledge transfer where the knowledge is solely created by researchers is utilised in the following ways:

- Diffusion: publishing the findings in scientific journals, advertising in media etc. The process is passive and simply aims to make the knowledge available.
- Dissemination: sharing the research outputs with potential stakeholders, e.g. conferences, sending the newsletters to intended audience etc. The process is still passive and aims to raise awareness of the research and possibly change attitudes of the audience.
- Implementation: putting the knowledge into practice by encouraging users to change their behaviour or setting up the audits. The process is active and aims to imbed the knowledge into a routine and to overcome barriers that prevent the users to do so (Stratton Johnson, 2005).

Thus, knowledge transfer implies that the research findings can be directly implemented into practice. However, the research knowledge is usually generated in

tightly controlled, experimental environments and it is rarely useful to apply 'as is' and needs to be adapted to fit a specific context (Gibbons, 2008). The biggest criticism of the knowledge transfer is the limited knowledge uptake due to the Two-Communities Theory, a concept that the researchers live in "different world" than that of the policy makers, clinicians and the service users (Caplan, 1979; Gibbons, 2008). The worlds differ because of conflicting values, cultures and diverse reward systems (Caplan, 1979). The researchers' lack of awareness of the context may result in the knowledge not being inappropriately utilised. This also links to another criticism of the knowledge transfer, which suggests that the process only flows in one direction, from the researchers to the policy makers and other stakeholders. One-directional knowledge transfer is often a product of a "research-push", where the process is initiated and conducted by the researchers to satisfy their interests rather than address a specific problem (Lavis *et al*, 2003), but if the knowledge is not perceived as relevant by the end user, it will not be utilised (Stratton Johnson, 2005). Therefore, the previously assumed knowledge transfer does not result in knowledge uptake and implementation. This may be a problem in care homes, since the research in this sector is still relatively undeveloped in comparison to acute setting or geriatric research in general (Davies *et al,* 2014). Hence some of the available evidence may not be relevant or practical for the care homes.

Knowledge translation (KT) aims to move what has been learnt in research into the context of the setting. The word 'translation' is not incidental as it suggests that the scientific evidence may need to be adapted to the existing environment (Gibbons, 2008). The KT framework builds on knowledge transfer but also aims to overcome the barriers, resulting in knowledge which is directly applicable and relevant to the setting. Knowledge translation aims to include all the research steps from the inception of the project to its application at the population level (Stratton Johnson, 2005), meaning that the generation of the knowledge and its implementation are not seen as separate entities. As a result, KT itself helps to define research questions, choose appropriate methodologies, interpret the findings and contextualise them, and apply them to the real-life problems (Sudsawad, 2007). As such, it requires a continuous dialogue between knowledge creators. The key characteristic of the KT is therefore a multidirectional communication between all stakeholders at each step of the knowledge creation (Stratton Johnson, 2005).

3.1.2 Rationale for using Implementation Science

Knowledge Translation provides a theoretical framework on how the knowledge should be generated and utilised but is not concerned with how this knowledge is implemented. Implementation Science addresses this gap by providing methodology that facilitates the uptake of the evidence into practice.

Implementation Science was chosen for the research in this thesis because it offers a more pragmatic methodology that guides the researcher though the complexity of the clinical setting. In contrary to the traditional research, it embraces rather than controls the variation, therefore provides real-life solutions to the problems. Additionally, Implementation Science allows to test the interventions on a small scale before they are escalated to the wider context. This allows for the early recognition which interventions work, allowing for making better decisions and avoiding the waste of resources. This may be especially important to the care homes, which often struggle financially and are understaffed. Another benefit is that data collected using Implementation Science allows for making conclusions not only about what works, but also about the barriers and facilitators for making it work. This enables the researchers to disseminate the findings and provide solutions to the problems that others can face when implementing similar interventions.

3.1.2.1 Model for Improvement

Early implementation research was mostly driven by outcomes and rarely provided theoretical framework underpinning the work, and as a result most of the studies did not report justification for the interventions and theory used (Davies *et al*, 2010). Without understanding the theoretical framework, it is difficult to determine how and why interventions fail or succeed, and therefore lack of underpinning theory hinders their dissemination into the wider context. As with other types of research, projects that aim to change practice need to adhere to a theoretical framework, which provides the structure and the systematic approach (Dawda and Raymond, 2016).

The framework chosen for this research is the Model for Improvement, which has been specifically developed to facilitate the implementation of knowledge into any healthcare setting. The model is based on the three fundamental questions that represent the aims, measurement and interventions and have been known as Nolan Questions or Nolan Approach (Langley, 1996):

- The first question ‘What are we trying to achieve) encourages the users to examine the current processes and focus their action on one identified aim.
- The second question ‘How will we know that the change is an improvement’ links to the measurement and helps to define the outcome, process and balancing measures, which can be captured to monitor the progress for both, beneficial and potential negative effects of interventions.
- The third question ‘What change can be made’ concerns the specific interventions that can be designed to directly or indirectly influence the overall aim.

The framework further enables the execution of the improvement activities using small tests of change, also known as Plan-Do-Study-Act (PDSA) cycles, described in more detail in section 3.2.2.2 (Langley, 1996). As opposed to other frameworks, the Model for Improvement aims to establish not only whether designed interventions work, but to understand what works in the setting and how this can be accomplished (Walsche, 2007). It also encourages collaboration between multiple users in planning, testing and implementing changes. Therefore, Model for Improvement framework provides a flexible, pragmatic approach required for the conduct of this study. One of the appealing elements of the Model for Improvement is also its simplicity (Figure 3.1), which may be of importance when it is used by individuals with little knowledge of Implementation Science.

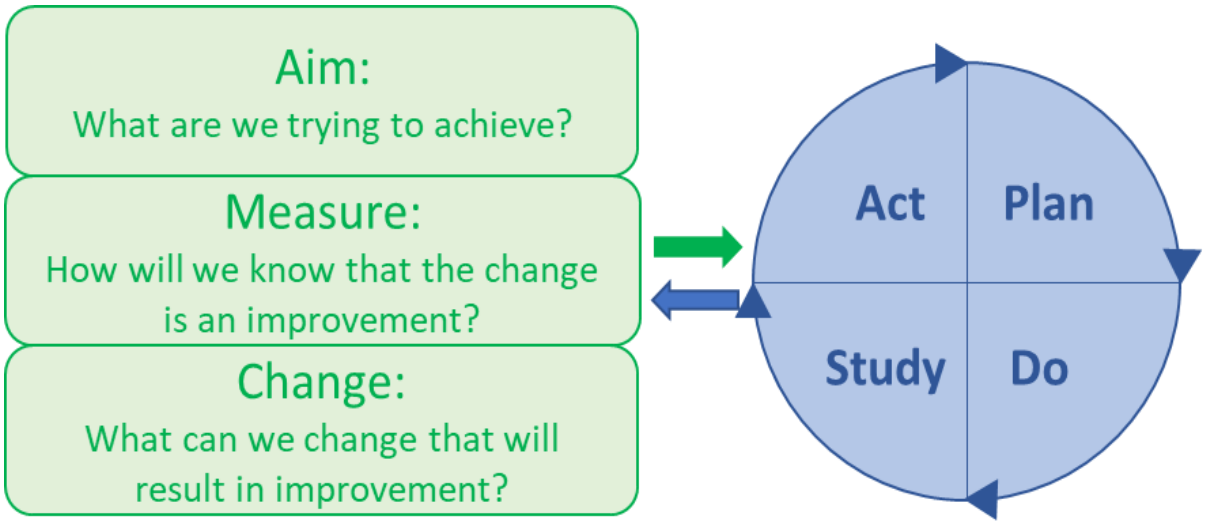

Figure 3.1: *The Model for Improvement framework (Adapted from Langley et al, 1996).*

3.2 Data collection and analysis methods

This research has been divided into four phases (preparatory, exploratory, intervention and evaluation), which aim to meet the objectives outlined in the introduction (Section 1.2). The purpose of preparatory phase was to explore staff perceptions and experiences of the hydration care they provided. The purpose of exploratory phase was to explore the attitudes of staff and residents towards hydration and to determine barriers and facilitators to adequate hydration. This work was necessary to inform the design a range of improvement activities, which were tested for effectiveness and practicality in the Intervention phase. The purpose of the evaluation phase was to determine the effectiveness of these interventions on fluid intakes and health outcomes of care home residents. The summary of research objectives and the methodological approaches used to answer them are shown in Table 3.1.

3.2.1 Exploratory phase

3.2.1.1 Focus groups

A focus group is a group interview where participants are asked about their opinions, beliefs, knowledge or experiences. Focus groups facilitate the interaction between the participants that allows the researcher to explore the topic in great depth but act more as a bystander than a traditional interviewer (Bloor *et al*, 2001; Orvic, *et al,* 2013). The group work encourages a more natural way of communication than that with individual interviews because people behave closer to how they would in the everyday life such as telling jokes and anecdotes, sharing feelings, everyday jargon or the arguments (Powell and Single, 1981). It also allows the interviewees to learn from each other, which results not only in richer data for the researcher, but also an enhanced experience for the participants (Leung and Savithri, 2009).

Focus groups rather than individual interviews were chosen for this study because it was felt that the group discussion would provide the greater insight into the values, shared opinions and common knowledge, and would help in exploring the cultural contexts of hydration care. Capturing the data on culture and opinions was thought particularly important for this research as it was thought it could influence how hydration was provided.

***Table 3.1**: Overview of the research describing the phases, their objectives and the methodological approaches.*

Phase/ Objective	Activity	Setting and participants	Purpose	Data collection	Data analysis	Outcomes
Exploratory phase (Objective 1 and 2)	Stakeholders' interviews	Staff (all departments), residents unit A & B	(1) To explore the staff and resident attitudes towards hydration (2) To determine perceived patterns of hydration care	Focus groups, participant observations	Thematic analysis	Staff and resident opinions on current processes, barriers to adequate fluid provision (staff), barriers to adequate fluid intakes (residents)
	Observations of daily practice	unit A and B Staff & residents	(1) To determine patterns of hydration care (2) To identify the residents at risk of underhydration	Participant observations	Descriptive/ inferential statistics, thematic analysis	Fluid intakes, no. and frequency of drinks given, % of residents given drinks (quantitative data) Barriers to adequate hydration care (qualitative data)
	Defining interventions	Unit A and B Staff, residents, family	(1) To identify opportunities to optimise hydration (2) To develop the interventions to optimise hydration	Process mapping, Action-Effect Method	n/a	Process maps, Action-Effect Diagram, Interventions
Intervention phase (Objective 3)	Preliminary work	Unit A and B Staff and residents	(1) To provide hydration training for the staff (2) To identify fluid preferences of the residents (3) To identify cup preferences of the residents	Questionnaires	Descriptive and inferential statistics	(1) Self-reported before-after knowledge, enjoyment and usefulness of training (2) % of positive answers for fluid preferences (3) Weighted median scores for cup designs
	Interventions	Unit B: Staff & residents Dissemination to unit A: Staff and residents	To test the identified interventions for the effectiveness, feasibility and acceptance of staff/resident	PDSA cycles (data from observations and feedback)	Descriptive statistics	Fluid intakes, no. and frequency of drinks given, % of residents given drinks, types of fluids given as appropriate, Barriers and facilitators to sustainability
Evaluation phase (Objective 3)	Outcomes	Unit B Residents	To assess if the interventions influenced fluid intakes and health outcomes	Participant observations, questionnaires	Run charts and SPC chart	Fluid intakes, incidence of Hydration Linked Events, laxative and antibiotic use

While the interviews could have provided more depth and therefore more insight into individual experience, the one-to-one interaction could also have made the participants feel inhibited and less likely to share their opinions. Focus group feels less threatening, especially if participants share the same experiences or know each other (Barbour, 2005), hence it was also thought that recruiting into the focus groups would more staff to participate. From pragmatic point of view, it was also thought that it would be easier to recruit the potential participants by scheduling an organised session. The deputy manager also felt more comfortable promoting this activity rather than the individual interviews. The practical aspects of performing focus groups such as the relatively low cost, ease of organising and short time necessary for obtaining data (Reed and Payton, 1997; Beyea and Nicoll, 2000) were also seen as potential advantages for using this methodology.

There are some limitations to using focus groups, but it was thought that these were not of much concern in this study. For example, while the focus group may feel inhibitory for some participants (Acocella, 2012), it was thought that individual experiences were less important since the focus groups intended to explore the culture within the homes and the general attitudes of staff towards hydration care. Additionally, to ensure that the participants did not feel inhibited when discussing hydration, the sample did not include any senior members of staff.

Focus groups were used to collect data in preparatory and exploratory phase. The reason for the chosen methodology was two-fold. It was thought that exploring this new topic required an in-depth, descriptive, qualitative approach. Focus groups were appropriate and more convenient because the sessions were conducted in naturally occurring multidisciplinary groups. This provided an additional advantage because the staff feeling comfortable were more likely to engage in a meaningful discussion. The intention was to conduct two focus groups lasting approximately one hour, in each of the two phases of this research. All focus groups were audio recorded and transcribed verbatim.

Data analysis: Thematic analysis

Thematic analysis is widely used for analysing qualitative data and providing a rich description of obtained results (Patton, 2002; Taylor, 2014). The advantage of this method is its relative ease of use for researchers less familiar with the qualitative

methods of data analysis, because it provides a lot of flexibility into how it is applied (Thomas and Harden, 2008; Guest *et al*, 2012). The analysis aids organising the data set into patterns (themes) and allows the description of the findings in a rich detail (Taylor, 2014).

Since there was a relatively small number of qualitative studies describing hydration care, it was thought that analysing data using Thematic Analysis would be the most appropriate because it allows a rich description of the data and can be used for an inductive approach where no pre-existing knowledge is available (Braun and Clarke, 2006). Thematic analysis was used for analysis of all data derived from focus groups. The following six steps to performing thematic analysis were used as recommended by Braun and Clarke (2006):

Step 1 – Familiarisation with the data: This step involved reading and rereading of the data for identification of emerging patterns; comments were written in the document to record initial ideas for coding. In this study, the notes were also taken during the focus groups, which contributed to initial coding as well as discussion. Upon transcribing the recording verbatim, the document was read while listening to the recording and corrections were made as required. The document was read a couple more times before the coding started; at this stage further notes were also taken to aid the analysis and discussion.

Step 2 – Initial coding of the identified patterns: Initial stages involved highlighting the phrases in the transcripts in a word document and attaching the codes if already identified. The highlighted sections were copied into the Microsoft Excel document with a record linking to the initial document, any identified codes as well as comments generated in the first step were attached to the phrases. The remaining phrases were coded as appropriate at this stage.

Step 3 – Searching for themes: The list of codes was copied into a separate Microsoft Excel sheet. The search for the relationships between the codes enabled to collapse them into subthemes, and these were eventually categorised into themes.

Step 4 – Reviewing the themes: To ensure accuracy, an independent researcher who was familiar with the data set reviewed the themes and subthemes. Any

discrepancies were discussed until agreement was reached. The thematic map was created in a form of table in another Microsoft Excel sheet.

Step 5 – Defining the themes and subthemes: At this stage the themes were named and put in the order they would be reported.

Step 6 - Producing a written report: The narrative description of the themes and subthemes was produced and supported by quotes extracted from the original transcript

To avoid misinterpretation of the themes, an independent researcher familiar with the data set was asked to cross-check the patterns for emerging themes in this study.

3.2.1.2 Participant observations

This type of data collection method aims to gain a holistic overview of phenomenon for a specific setting or group of individuals (Kawulich, 2005). Participant observations derived from the ethnographic work of anthropologists, who used this method to study customs of non-western societies and usually involved living with the group to be studied, learning the language and participating in their customs (deWalt and DeWalt, 1998; Kawulich, 2005). This method was later used and refined for the use by social scientists (Kawulich, 2005). The most beneficial use of participant observations is for the preliminary stages of exploring a new topic. For such, it is difficult to find an alternative research design because other methods may be more time consuming and the important findings may never be discovered. This type of research can also be used when the knowledge already exists, for example the observations may provide additional information supporting quantitative knowledge or when discrepancies occur. Participant observations offer invaluable opportunity to discover what really happens, as opposed to gaining information from the insiders who may be unable to provide such insights or may be more inclined to express what should happen (Dahlke *et al,* 2015). Observations also provide the situational context as to why and how phenomenon occurs by witnessing the group and individual behaviours and interactions.

Participant observations were chosen for several reasons. Firstly, conducting focus groups or interviews could only provide the data on opinions and perceptions of

those interviewed. With the objective to identify the barriers for the residents to consume adequate fluids, it was necessary to use the observation technique to explore the experiences of residents, which would answer the 'why' and 'how' questions more accurately. Secondly, data obtained from observations would be of sufficient depth, therefore would be most suitable to explore a complex problem such as hydration. Thirdly, while focus groups were an appropriate for exploring staff perceptions of hydration care, it was felt that informal chats with residents, conducted as a part of participant observations would feel less threatening to the residents when exploring their opinions and experiences. Participant observations, where an event may be observed and briefly discussed were a more attractive method of data collection for this vulnerable group. Additionally, the short, informal chats that formed a part of observation were more feasible to conduct with residents who suffered from some disabilities or could not provide a written consent to a formal interview, and whose views would otherwise be missed.

The level of researchers' involvement can be adjusted to the purpose of the research and may range from passive-participation where the researcher is a bystander to the complete participation where the researcher is a part of the group before the study begins (deWalt and DeWalt, 1998). The level of involvement determines the objectivity of the researcher. This needs to be balanced as both the high and low level of participation also bearing the risk of bias. High level of participation leads to the loss of objectivity, but lowest level of participation the participants are likely to alter their behaviours to reflect what they think the researcher would like to see (McCurdy and Uldam, 2014). The lowest level of participation also does not allow for interaction between the researcher and the study group such as asking questions or requesting other types of information, which may lead to important knowledge being undiscovered. In this study, the initial observations involved a high level of participation. This enabled the initial data collection and creation of observations tools and allowed the staff and residents to get used to the researchers being on site. Following the initial observations, the level of participation was reduced, but still involved some interaction with staff and residents. To further avoid the risk of bias, triangulation was used, where more than one researcher was involved in observations to ensure consistency in data collection.

Participant observations allow for a degree of flexibility by using a wide range of research tools such as direct observations, participation in activities, informal interviews, examination of personal data or objects, note taking and reflexivity journals (deWalt and DeWalt, 1998). These tools can be adapted to fit with the aims of the study (Savage, 2000).

Participant observations were used for all phases of this research except for preliminary phase. The exploratory phase used this method of data collection to explore hydration care patterns including fluids served, assistance and monitoring offered to the residents and fluid intakes of the residents. The intervention phase used observations to collect data on effectiveness of the interventions including the number of residents given drinks, amounts of fluids served and consumed and assistance provided. The evaluation phase used this method of data collection to assess the effect of interventions over time.

Data analysis: descriptive statistics

This method is used to quantitatively summarize the data. This type of statistics provides a simple description of the data to identify its most important features. The tools widely used include measures of central tendency (e.g. mean, median or mode), associated statistical dispersion (e.g. range, standard deviation or variance) and proportions (e.g. percentage). Most of these tools have been used in this research to describe data as appropriate. This type of statistics also includes a description of relationship between two or more relationships (e.g. correlations). Two types of correlations were used in this research:

Pearson's Correlation Coefficient: which is a linear measure of the relationship between two continuous variables. The test is parametric, which implies that the data is assumed to be normally distributed.

Spearman's Rank Correlation Coefficient: as Pearson's Correlation, it tests a relationship between two variables, but it is distribution free, therefore is a non-parametric test often used as an alternative. This test can also be used when testing variables on ordinal scale.

Descriptive statistics were used to analyse the data obtained from participant observations in exploratory, intervention and evaluation phases.

Data analysis: inferential statistics

This type of statistics includes the tools that aim to test the hypotheses and sometimes derive the estimates. The purpose of this type of statistics is to derive assumptions about the population based on a sample tested. The tools used in this research included:

Independent t-test: The test measures the means of two independent groups on one continuous variable. The test assumes that the outcome variable depends on the grouping variable with two categories, which means that they divide the sample into two distinctive groups. Since the test is parametric, the following assumptions are made: the data is normally distributed, there is a homogeneity of variances, there are no significant outliers, and there is an independence of observations (i.e. one subject cannot fall into both categories). Independent t-test was used to determine the differences between the location of the residents (e.g. own room vs communal areas) in the variables such as volume of fluids offered and consumed, percentage of fluids received at mealtimes and the percentage of fluids derived from fluid rich foods.

One-Way ANOVA: The test is similar to the t-test but measures the difference in means for two or more independent groups. The test is also parametric and needs to meet the same assumptions. This test was used to determine the differences in the types of the residents (e.g. level of assistance required) in variables such as volume of fluids offered and consumed, percentage of fluids derived from food and percentage of fluids received at mealtimes.

Pearson's Chi-Squared: The test analyses the relationship between two variables, where the dependent variable is measured on a nominal scale. The data can be tested on two or more independent groups. The test is non-parametric, therefore does not require assumptions associated with other tests. This test was used to compare the number of drinks given to the residents at different locations.

Inferential statistics were used in exploratory phase to describe the differences in fluid provision based on different types of residents, locations where they stayed and the times the drinks were served.

3.2.1.3 Process Mapping

Process mapping is a tool used in Implementation Science to describe how specific processes occur (Needy *et al*, 2008). The method was first introduced in industrial engineering and used in manufacturing industry (Needy *et al*, 2008). The use of process maps in healthcare has been popularised in the last two decades, where it has been recommended as an alternative to audit (Taylor and Randall, 2007; Trebble *et al*, 2010; de Bucourt *et al*, 2012). A simplified example of the process map is shown in Figure 3.2.

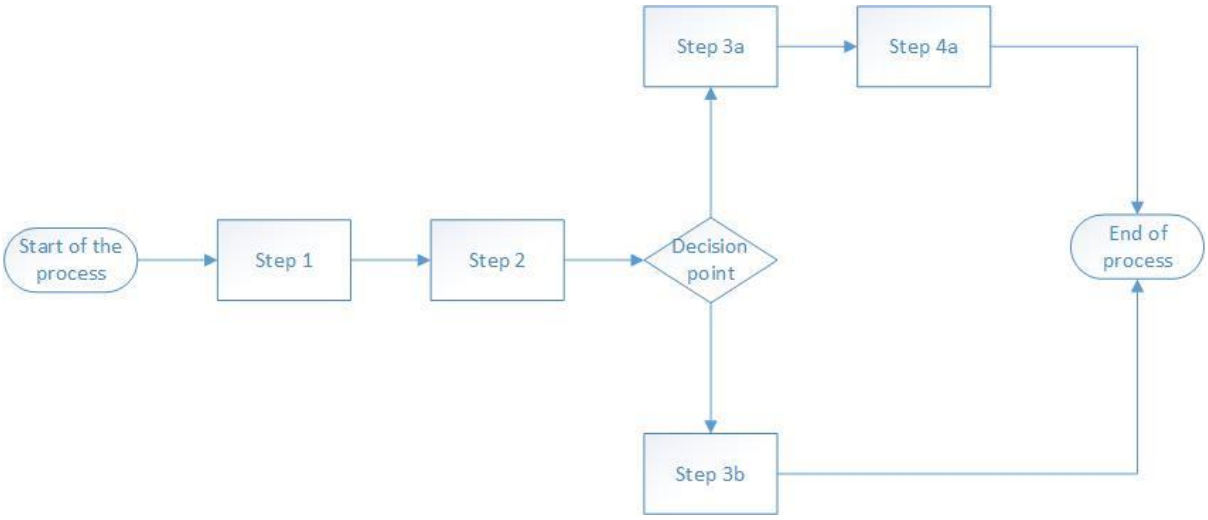

Figure 3.2: *The basic process map diagram. The map is constructed using universally recognisable symbols: oval for start/finish of the process, rectangle for task or activity, diamond for decision point (Phillips and Simmonds, 2013). All blocks are joined by thin arrows representing the process flow.*

Research suggests the usefulness of the process mapping in improving care. Studies reported that the process map can help in facilitating better communication within the multidisciplinary team (de Bucourt *et al*, 2012), identifying team members' responsibilities (de Bucourt *et al*, 2012), identifying barriers and facilitators (Johnson *et al,* 2012; Hong, 2013) and identifying improvement activities (de Bucourt *et al*, 2012; Johnson *et al,* 2012; Hong, 2013).

The benefit of the process mapping is that it aims to seek the input from all stakeholders, so the most accurate image is obtained of how things 'really are'. In resource limited environment, process mapping offers results in a short session, which provides time and money saving if used as an alternative to observations. However, the results highly depend on the group dynamics during discussion. As

with any group work, choosing appropriate sample for the activity will yield more accurate results. Failing to include some important stakeholders may result in some information being missed and the map not being the true representative of the process. Similarly, including both, the junior and senior members of staff may result in some staff unwilling to share some important information in fear of being criticised. This could result in the staff reporting what they think the process should be or what the senior staff would want it to be like (Trebble *et al*, 2010).

It was thought that process mapping would be beneficial to this project for three reasons. Firstly, since the researcher was an outsider to the setting, it was expected that this activity would allow to build the connections with staff and identify those who were particularly interested in improving hydration. It was also thought that constructing the process maps would offer a communication tool for the researcher to interact with staff and residents and brief them about the project. Thirdly, it was hoped that identifying the problems within the processes would encourage the staff to open and discuss the difficulties they faced when providing hydration care to the residents.

The conventional process mapping is a whole team activity, where all stakeholders discuss the processes and barriers they face. (Taylor and Randall, 2007; du Bucourt *et al*, 2012). It was decided that the conventional process maps were not practical to obtain. The main reasons for this decision were the time limitations for staff to attend the session and the possible reluctance of the residents to openly discuss the problems they may have. Additionally, based on the results of the focus groups in the exploratory phase, it was thought that staff may not be realistic in their views on hydration care they provided to the residents. Hence it was thought that constructing the process maps following the observations and obtaining feedback from all relevant stakeholder would be more convenient and would yield more accurate results.

For analysing process maps, the team can apply a series of questions to identify the problems. This helps the team identify barriers and facilitators, unnecessary steps in processes and other issues that the team may face. Since the process map in this study was constructed based on the findings from exploratory phase, analysis of the process maps was not necessary.

3.2.1.4 Driver Diagram

Driver diagram is a commonly used in Improvement Science. It helps to understand which components may influence improvement in a given context (Fathima, 2016). The diagram shows a relationship between the aim of the project and the factors that influence it, hence it enables the project team to consider interventions and plan to test as part of their improvement activities (Muething *et al*, 2012). The diagram also links to Model of Improvement framework because the first element of the diagram is the answer to the question: “what are we trying to achieve?” while the last elements are linked to the third question “what changes can we make to result in improvement?” (Bennett and Provost, 2015). It helps the project team to stay focused and on course when used regularly during the improvement work (Fathima, 2016).

There are several advantages to using driver diagrams. By constructing the diagram, team members can determine necessary changes as well as possible barriers to achieve them (Fathima, 2016). Once the interventions are identified, the team can recognise the drivers that need to be prioritised or the drivers that could be changed relatively easy and help keep the team motivated (IHI, 2012). The diagram can be used to clearly illustrate the rationale between the actions and the aim of the project as well as making decisions about which action to take up next. The diagram can also help with defining the measures to monitor the progress (CMS, 2013).

Driver-diagram was chosen for this research because, like process mapping, it encourages team building and involves all team members in decision making. Social change may also be necessary when implementing new activities, hence it was hoped that by creating the diagram, the team would be more engaged and receptive to making a change. Additionally, it was thought that if staff were involved in decisions about the changes, it would result in more engagement with the project. It also provided a great opportunity to obtain the theories of the staff directly involved in providing hydration care, which would result in more innovative ideas to be tested.

A variant of the driver diagram, an Action-Effect Diagram (AED), was used in this study. This method adds further components such as the process and outcome measures and linking the interventions to the current evidence. The diagram links to process mapping because many contributing factors as well as the barriers to

specific interventions can be identified through this step. This method was thought preferred to a traditional driver diagram because it helped to establish the outcome measures.

It is recommended to construct the diagram early in the project and involve all stakeholders in creating AED. In this study, the AED session was conducted at the end of the exploratory phase, where all preliminary data were collected and all staff in care home were given feedback. The stakeholders including care home staff and managers, general practitioner, speech and language therapist, residents and family were invited to participate. The session was planned for two hours and was to be supported by an experienced facilitator. The conduct of running the session and constructing the diagram were planned to follow the recommendations described by Reed et al, 2014. The initial step was to identify a shared aim agreed by the whole team (Bennett and Provost, 2015). The layout of the diagram usually places the aim on the left to encourage readers to start at this point; although this feature is not necessary (Bennett and Provost, 2015). The name ‘shared aim’ is not incidental; it represents the voice of all stakeholders. The AED strategically placed the shared aim to the left. When read from the left, it answers the third Nolan question “what changes can we make?”; when read from the right it answers the first Nolan question “what are we trying to achieve?”. To the left, there are factors that directly influence the aim; these are known as major contributory factors in AED. Some of the contributory factors were evidence based (e.g. providing residents with drinks of their choice), while others were identified through observations in exploratory phase (e.g. ensuring all residents have enough opportunities to obtain fluids). The purpose of contributory factors was to organise work into themes and identify possible process measures (Bennett and Provost, 2015). The process measures linked AED to the remaining question of the Model for Improvement: “how will we know if the change is an improvement?” (Bennett and Provost, 2015). Each major contributory factor is affected by smaller factors. The last column represents the specific changes, which could be made to optimise hydration of the residents. It was hypothesised that these changes would influence the contributory factors and subsequently influence the shared aim. The arrows connecting implementation activities, contributory factors and the aim formed the cause-effect chains that represent the rationale of using specific interventions.

There is no need to analyse the diagram, but it is necessary to determine which interventions are the most urgent to test. To be truly effective, AED needs to be revised as the work progresses. This demonstrates the dynamics of environment where resources, cultures and attitudes are various and unpredictable (Bennett and Provost, 2015). Following the learning, any changes such as new ideas, modifications or removal of the ones that did not show a desired effect should be made (Svoronos and Mate, 2011). This approach was used in this thesis and the diagram presented in Chapter 5 is the final version of the AED.

To maximise the effectiveness of the AED, it must also be accompanied by a mechanism for testing changes. In this thesis, PDSA cycles (described in more detail in section 3.2.2.1) have been used.

3.2.2 Intervention phase

3.2.2.1 Plan-Do-Study-Act (PDSA) cycles

The cycle was first popularised by Edward Deming as a concept for testing changes to continuously improve quality in industrial settings. It has later been adopted for use in healthcare setting, particularly since the introduction of the Model for Improvement framework (Curnock *et al*, 2012). As opposed to Process Mapping and Action-Effect Method, PDSA has been extensively studied and its effectiveness is well established (Taylor *et al*, 2014; Bennett and Provost, 2015).

In Improvement Science, PDSA is preferred to traditional approaches because it starts by testing ideas on a small scale (such as staff member, for a short period of time, etc.). This allows experimentation without the risk of disruption and requires little financial input (Hallett and Hewison, 2012). The iterative nature of PDSA cycles allows for adapting the interventions to specific setting. If problems are identified in one cycle, these can be accounted for in the next. This flexibility is important in complex settings such as healthcare (Reed and Card, 2015). As a result, the chain of PDSA cycles allows for introduction of the fit-for-purpose intervention making it more likely to be embedded in practice and sustained over time (Curnock *et al,* 2012). Different interventions can be introduced at the same time and it has been shown that many improvement projects successfully used multiple cycles for making change (Byrne *et al*, 2015). This methodology is preferred in Implementation Science because it does not impose on staff but engages and seeks their input in the design

(Powell *et al*, 2009). Due to the nature of the PDSA cycles, the amount of data collected is usually very small, hence the limitation of this method is the inability to draw inferences on the effectiveness of the interventions. However, this may not be important to the project as the implementation activities are likely to be derived from the existing evidence.

The PDSA methodology was used for all implementation activities described in this thesis (Table 3.2). The PDSA approach was chosen largely because it fits with the Model for Improvement framework. Because of its learning through small, iterative cycles, PDSA provided an attractive alternative to a traditional large-scale approach. Since many of the identified strategies were tested for effectiveness before, it was thought most beneficial to adapt them into the context of the setting and to achieve this, there is no alternative to PDSA. Additionally, the cycles provided a greater level of engagement with the front-line staff and it was hoped that by doing so, the PDSA testing would help to establish sustainable changes.

Table 3.2*: List of implementation activities described in this thesis*

Intervention	**Purpose**	**Description**
Protected Drinks Time (PDT)	To provide one opportunity during the day when all residents are given drinks	All staff focused on providing hydration care, ensuring all residents are given drinks, appropriate assistance and offered refills.
Drinks Menu	To facilitate decision making for the residents when choosing drinks	A pictorial menu of all drinks available in a home offered to the residents at each drinking opportunity
Drinks before breakfast	To provide additional opportunity for the residents to receive fluids in the morning	All residents brought to dining room/lounge before breakfast offered a drink
New drinking vessels	To provide drinking vessels that better suit residents' needs	New mugs, tumblers and assistive devices introduced to the unit in place of standard equipment
Refreshment needs cards	To provide staff with an easily accessed information about residents' drinking preferences and requirements	Cards with residents' photos and description of the needs and preferences distributed in residents' rooms and communal areas and available to staff at all times

Each intervention was discussed with the staff in a care home in advance and the plan for PDSA was drawn. A complete PDSA cycle resembles a scientific method of

formulating hypothesis, conducting an experiment, analysing data and drawing conclusions. The purpose is to learn as quickly as possible and to make adjustments based on that learning (Reed and Card, 2016). The cycle consists of four stages, which can be repeated for as long as necessary (Speroff and O'Connor, 2004). In this thesis these were conducted as follows:

Plan: The change to be tested was described in the Plan stage. This required a careful consideration of how the change was going to be introduced, such as when and where the change will take place, how long it would last and who was responsible for certain tasks. This also involved a prediction of what might happen during the test. The prediction included the benefits as well as potential barriers and negative outcomes. This was important because it allowed the team to anticipate and overcome the barriers during the testing. To be able to evaluate the effectiveness and feasibility, the plan also included what type of data was going to be collected. This phase, despite being time consuming was the most important of all because it influenced how the tests were carried out. For example, poor consideration of the measures would limit the amount that could be learnt from the cycle or not assigning people to their roles would result in the test not being carried out at all. This would contribute to a waste of time and resources.

Do: This was the execution stage, which involved testing and collection of the data as planned in a previous cycle. As opposed to the traditional experiments, PDSAs test the changes in an uncontrolled setting and even the best predictions may not be accurate. Therefore, a detailed description of what happened during the test was included in data collection.

Study: This stage enabled an evaluation of the previous step. Data collected was analysed, compared to predictions and to the baseline data. Feedback was collected from staff, residents and family to seek opinions on acceptability and practicality of the interventions. Any deviations from the plan were studied for potential barriers to determine the feasibility of the intervention.

Act: The last stage allowed drawing conclusions and moving forward. If the data showed no improvement or the intervention was not well accepted, the existing process remained unchanged and the cycle was abandoned. If the data showed the potential for improvement, it initiated another PDSA cycle, either to escalate the

intervention into a wider context or to make necessary adjustments. If the intervention was successful on a large scale, it was implemented as a routine. The next *Plan* stage closed the loop of the PDSA cycle.

Details of conduct of individual PDSA cycles are provided in more detail in Chapter 7 when each intervention is described separately.

3.2.2.2 Questionnaires

These are a data collection method where questions are asked, and the answers are completed by either the subject or the facilitator. This research method gained its popularity in the mid-20th century, where it was widely used by researchers in many fields (Willem *et al*, 2014). Due to its ease and convenience of conduction, minimal effort for the data collector, and a potential to return many responses, it has been a preferred, although sometimes overused method for data collection (Boynton and Greenhalgh, 2004; Gillham, 2008; Willem *et al*, 2014). The questions can be open or closed ended depending on the needs of the research (Munn and Drever, 1990). Due to their popularity, most of the participants already have an experience in completing a questionnaire, which is of a benefit to researcher as participants may feel less anxious. Since the responses are usually anonymous, participants are more likely to respond honestly comparing to the face-to-face interviews (Wakley, 2005).

Questionnaires were chosen for this study because they allowed for an efficient way of capturing quantitative data from staff and residents. It was thought that while the data would be lacking the qualitative depth, this approach would be sufficient to obtain the information on what residents liked and required, and that they would discuss potential barriers that prevented them from drinking. Considering the pragmatic approach in this thesis, it was thought that the qualitative data on these issues was not vital to this part of research, but this approach allowed better communication with busy staff and the residents with cognitive impairment.

Questionnaires were used to obtain feedback from the training sessions delivered to staff in a care home, to collect responses from drink tasting sessions and to evaluate the design of drinking vessels. Due to the limited access to internet as well as an anticipated poor knowledge of technology in majority of the residents, participants were given paper copies. For training, staff were asked to complete the questionnaire immediately after the session. Drink tasting and cup testing, the

residents were asked questions and the responses were recorded by the investigator. Questionnaires included predominantly closed-ended questions, which allowed for analysing the data quantitatively. A few open-ended questions were included to offer an opportunity for the participants to provide additional feedback. The questionnaires were tested on a small group of staff who attended the first training session and revised before the data collection started.

Data analysis: descriptive and inferential statistics

Data were described using descriptive and inferential statistics as explained in previous sections. The results of drinks tasting were presented using the percentage of positive responses. Cups were evaluated using median and the relationships between the characteristics of the vessels were tested using Spearman's rho (described in Section 2.2.1.2). Results of staff training were analysed using median, mode and percentages. The hydration knowledge before and after training was analysed using the Wilcoxon Signed Rank Test. This type of test is used on ordinal or continuous, non-parametric data of two related samples or repeated measure of a single sample, where as in a case of this study, it provides an alternative to using a paired t-test when the requirements associated with parametric testing are not possible to achieve.

3.2.3 Evaluation phase

Data on the effects of the interventions on fluid intakes and health outcomes were collected in two ways. Firstly, in line with the Implementation Science principles, a selection of measures was used to monitor the progress. This required data to be collected at frequent intervals. General recommendations suggest that the process, outcome and balancing measures should be monitored over time (Dawda and Raymond, 2017). The measures used for evaluating the intervention phase are listed in Table 2.3. Process measures relate to the performance and efficiency of the system, which are thought to affect the outcomes. Outcome measures reflect the impact of these processes on the residents. In Implementation Science, both the process and outcome measures are important to evaluate impact (McQuillan *et al*, 2016; Dawda and Raymond, 2017). This is because of the pragmatic approach of implementation activities, which aim to evaluate not what works but also how and why. Without the process measures, it would be impossible to determine if the resulting changes were due to the changes in the processes. On the other hand,

without the outcome measures, it would be impossible to establish if the changes in processes truly resulted in improvement (Solberg *et al*, 1997). Balancing measures aim to determine undesired outcomes. These are also necessary to ensure that while the improvements are made, there is no deterioration to other important processes and that the improvement itself has no negative outcomes on participants (Dawda and Raymond, 2017).

Table 3.3: *Measures used for evaluating the intervention phase*

Measure	**Rationale**	**Analysis**
Fluids served to the residents	To evaluate if the implemented activities resulted in staff offering more fluids to the residents	Run chart
Fluid intakes	To evaluate if the implemented activities resulted in an increase in the fluid intakes of the residents	Run chart
Hydration Linked Events	To determine impact of interventions on health outcomes (UTI, respiratory infections, falls, constipation, delirium and hospital admission)	Run charts
Laxative use	To evaluate if the interventions prevented episodes of constipation and hence decreased the need for laxative use	XmR chart
Antibiotic use	To evaluate if the interventions prevented infections and hence decreased the need for prescribing antibacterial therapy	Run chart
Overhydration	To evaluate if increasing fluid intakes had a negative effect on the residents' health	-*

** No episodes of overhydration were reported, hence this data is not presented in this thesis. Overhydration was mentioned in this section to evidence that the potential negative outcomes were considered.*

Measurement for improvement aims to understand the reasons for variation in the data and helps to determine if the changes are sustainable (Perla *et al*, 2011). This method also provides an insight to not only what happens before and after the project but allows the changes to be monitored over time. This can help when learning from the data to make important decisions about processes (Solberg *et al*, 1997; Perla *et al*, 2011). To comply with recommendations of the Improvement Science experts, data for the measures were collected over time to evidence the effect of the interventions as well as their sustainability. Whenever possible, the established measures should be obtained from existing data routinely collected and readily available (Solberg *et al*, 1997), however, majority of data needed for this thesis was not routinely collected. To ensure an accurate estimation of fluids served and consumed, the participant observations (Section 3.2.1.2) were conducted approximately every four weeks on a sample of six randomly selected residents.

Data on HLE were collected weekly using questionnaires (Section 3.2.2.2), where a nurse was queried face to face and the investigator recorded the data.

Data analysis for evaluating the effects of the interventions

Improvement measures were analysed using run charts and statistical process control charts.

Run charts: Run chart allows visual presentation of the data over time, with x-axis representing timeline and y-axis representing quality indicator. A median was calculated prospectively from the first ten data points available and was placed in the centre of the chart as recommended (Perla *et al*, 2011). Median was calculated for two reasons: it divides the data into two equal halves one on top and one at the bottom of the median line; and as opposed to mean, it is less sensitive to outliers hence provides better accuracy in presenting central tendency in this type of data (Perla *et al*, 2011). Annotations such as details of interventions or events with potential to influence the outcomes were also included. The advantage of this method over the traditional before-after tests is that run charts preserve the time order of the data and therefore inform whether the change is sustained over time (Perla *et al*, 2011). Run charts were analysed for significant changes using the following rules:

- Shift – six consecutive points either below or above the median,
- Trend – five or more consecutive points going up or down,
- Run – eight or more points on one side of the median and
- Astronomical point – which indicates an extreme outlier (Langley *et al*, 2009).

Run charts were used to analyse data on fluids served and consumed, incidence of HLE and the incidence of the antibiotics prescribed.

Statistical Process Control (SPC) charts: SPC charts plot data over time in a similar way to run charts. They use an average (mean or median) but also use control limits, which are set depending on the type of chart is used (Poots and Woodcock, 2012). The type of the chart used for this thesis was the Individuals and Moving Range Chart (ImR or XmR) chart, which is used on continuous data collected at each point in time (Mohammed and Worthington, 2013). As opposed to other types of charts,

the XmR chart does not need to satisfy any assumptions (Poots and Woodcock, 2012).

In this thesis, SPC chart was used to evaluate the consumption of laxatives. The average and the control limits were calculated based on historical data obtained from the drug charts. Data were analysed to determine whether variation seen on a chart were considered common cause or affected by special causes (Mohammed and Worthington, 2013). The common causes of variation indicated that the data was within the control limits. Special causes, which signalled the improvement were determined using the following rules:

- Any point falling outside the control limits (3 lengths of standard deviation)
- Two out of three consecutive points fall outside the 2 lengths of standard deviation
- Four out of five consecutive points fall outside the 1 length of standard deviation
- Eight consecutive points fall on the same side of the mean line (Mohammed and Worthington, 2013)

When special causes were observed, the average and control limits were recalculated to better represent a new process.

3.3 Ethical considerations

Research that involves human subjects always raises ethical issues that usually concern the research participants but may also extend to researchers and others involved. For most people, ethics are traditionally focused on experimental research where a new intervention or technology poses an obvious physical threat or suffering to participants. In non-experimental research ethical issues are different as they extend to emotional well-being of the subjects. The investigator has a responsibility of ensuring that no harm arises to any individuals participating in the study as well as themselves. Potential ethical issues identified in this study included safeguarding, freedom to participate and the right to privacy. The ethical responsibilities in this thesis extended to the vulnerable residents in the home, their families and the

participating staff. The evidence of maintaining the ethical conduct is provided in Appendix 3.

Freedom from harm

Freedom from harm concerns any physical and emotional harm that the research can cause to participants, as well as any potential discomfort that could arise from it (Rogers, 1987). It is the researchers' responsibility to minimise the risks and maximise the benefits of all involved. Since most of the interventions described in this study were evidence based and the negative outcomes not anticipated, the potential harm was limited to a potential discomfort in participating. To reduce this, the investigator complied with the freedom to participate.

Freedom to participate

Participants have a right to choose to participate in the study. To ensure the freedom to participate, gatekeeper consent was obtained from care home manager. This was to ensure that the gatekeeper responsible for well-being of residents and staff made an informed decision to allow the researcher to conduct the study and was aware of its aims. Additionally, frequent feedback ensured that the manager was aware of the activities taking place in a care home as well as the future plans. To ensure voluntary participation, the staff involved in the focus groups in this study were requested to provide a written consent, which provided a brief description of the study. Verbal consent was also obtained immediately prior to commencement of the focus groups. Subjects of informal interviews performed as a part of participant observations and PDSA cycles were asked to provide a verbal consent. Since the project was categorised as an implementation work, the observations were part of the evaluation of the current systems, and as such the individual consent was not required. However, the residents and staff were informed of the activities and when observed, the residents were asked the permission to do so.

Safeguarding

Researcher has a responsibility to safeguard vulnerable participants. To comply with the national requirements for safeguarding, the Disclosure Barring Service (DBS) check was obtained and presented to the care home manager. To support the best interest of the vulnerable residents, the investigator has also undertaken

safeguarding training and complied with care home's Safeguarding Policy throughout the entire project.

Right to privacy

The researcher also has an obligation to maintain the subjects' right to privacy. This is usually achieved by assuring anonymity and confidentiality. Anonymity ensures that the individual responses are not linked to the identity of the participant, which at times may be impossible to achieve (e.g. when conducting interviews). In this case, participants' right to confidentiality must be preserved.

To ensure anonymity, identifiable data collection was avoided whenever possible. For the focus groups, participants were requested to provide the nickname that they wanted to use for the duration of the interview. Written consent forms contained no source of information other than the name and signature of the participant and were kept in a locked filing cabinet at the university. All participants were assured that the responses would be kept confidential. Considering that the topics did not explore any sensitive issues and no identifiers were taken, it was not necessary to take any further precautions. Data from participant observations and PDSA cycles were only collected in a written format. At times, data collection required some identifying information to enable the linkage of the data. For this purpose, the residents were given the codes which were stored electronically in a password-protected file on the university premises. All participants were reminded that any information shared would be kept confidential and no identifiers were taken when recording the data. Implementation projects are often thought to pose no ethical issues to participants involved in the programme, although they may still contain a certain degree of a risk. For this reason, the freedom to participate should never be withdrawn (Lynn *et al*, 2007). Furthermore, it should be respected that despite the benefits, some people have a right to refuse a new intervention in the same way the patient has a right to refuse a well-established treatment. To ensure the ethical conduct, the investigator sought the approval from appropriate body. The approval from Integrated Research Approval System was not required since the study was defined as service evaluation project; instead the ethical approval was obtained from the College of Nursing, Midwifery and Healthcare Ethics Committee in the University of West London (CRSEC15).

3.4 Conclusions

This chapter discussed the theoretical approach underpinning the work undertaken in this research. It also provided a rationale and description of the method used for data collection and analysis used. The need for knowledge translation of available evidence on the topic of hydration mostly influenced the decision to use the pragmatic approach of this research. Benefits and limitations of each method were considered. In line with pragmatic paradigm, the rationale for using these methods was based on the research objectives as well as the feasibility of using them in the care home setting. The following chapters (4-8) outline the work conducted in this thesis including exploratory work, interventions and their effect on the fluid intakes and health outcomes. Each chapter provides additional details regarding details of data collection and analysis.

Chapter 4. Exploratory phase: Stakeholders' perspectives of hydration care

Literature review presented in Chapter 2 indicated that older adults experienced diminished thirst, which together with other physiological changes and morbidity may predispose them to dehydration. It also identified that providing adequate support had a potential to increase fluid intakes in this population, although some studies also reported that care homes did not provide appropriate hydration care. The current evidence provides only a few examples of good practice; therefore, it is difficult to determine what good hydration care should entail. In the absence of the appropriate recommendations, it is difficult to set goals and determine if the care homes provide adequate support for their residents, especially since little is known about resident preferences and expectations. On the other hand, there is also limited literature exploring the barriers to providing good hydration care as experienced by the care homes staff. Hence, there remains a gap in the literature about how these important stakeholders view current hydration care they receive or provide.

4.1 Objectives

The objectives for this phase of the research were to determine how hydration is perceived by the staff and residents, identify what barriers the staff face when they provide hydration care and how the residents experience this care.

4.2 Methods

4.2.1 Setting

The research presented in this and following chapters was conducted in one private care home, which provides accommodation for 160 residents of different levels and types of disability. The home provides 24-hr nursing care and has specialist units for residents with dementia, frail older people and young people with disabilities. At the time of data collection this care home was given a Care Quality Commission (CQC) performance rating '*Good*'.

4.2.2 Participants

Participants recruited for this part of the research were the staff and the residents in the care home. Staff included were those who had influence on hydration care of the

residents either directly (e.g. Healthcare Assistants (HCAs) and nurses who were expected to provide drinks and assistance to the residents), or indirectly (e.g. housekeeping and kitchen staff, who were responsible for delivering/clearing the drinks and supplies).

Residents came from two units (unit A and B) within the home that provided care for frail older people. Staff estimated that majority of the residents on these units were 70 years and older, most required full assistance with toileting and transfers, and many also suffered from some form of cognitive impairment. The units provided care for 21 and 25 residents (unit A and unit B respectively).

4.2.3 Data collection

Focus groups with staff

All staff from different departments across the home were invited to participate in one of two focus groups. A deputy manager was asked to help with organising the sessions, which took place on the site in the training room during the shift. Questions explored the following topics (Appendix 4 provides full schedule of questions covered):

- Current hydration care
- Importance of hydration comparing to other tasks
- Barriers to providing adequate hydration for the residents
- Strategies that help overcome these barriers

Focus groups were audio recorded. Written consents were obtained from all participants, but no demographic data was collected. Focus groups were recorded and transcribed verbatim.

Informal staff interviews

These interviews were designed to inquire about the current procedures for providing hydration care and used a structured questionnaire to capture the data (Appendix 4). Data were collected from staff on unit A and B only. Nurses, HCAs, Activity Coordinators (ACs) and the catering staff were approached and asked to answer a few questions relating to their daily routines. Interviews took place during the shift and required a few minutes of staff time. A few questions were asked on each occasion. Staff did not need to leave their unit or take a break when being

interviewed and ensured little interruption to their work. This provided a pragmatic approach for data collection, which would otherwise be difficult to obtain due to time pressures the staff experienced. Each question was typically asked to one staff member and the person was further prompted to obtain a clear answer if necessary. If the staff member was not able to answer the question or the response was not clear; the information was sought from another person. Responses were handwritten on a questionnaire and were later entered into a Microsoft Word document.

Resident interviews

A structured questionnaire was created to collect the data during conversations with residents (Appendix 4). Questions intended to determine what types of drinks the residents liked, how and when they liked to drink, whether they experienced any barriers to drinking and if their habits have changed since they came to the home. Open questions were used, and the residents were prompted with closed questions if they had any difficulty answering. Residents approached were those who were able to communicate freely, where this was not possible due to cognitive or physical disability the responses were obtained from the families. Data obtained were handwritten during the conversations and later entered into Microsoft Word and Excel. Verbal consent was provided by all residents.

4.2.4 Data analysis

Data provided by staff and residents were of qualitative nature and were analysed using Thematic Analysis. Rationale for choosing these methodologies is provided in section 3.2.1.1 in the methodology chapter.

4.3 Results

One focus group was conducted, consisting of eight staff members; no staff attended the second session. The participating eight staff members included three HCAs (HCA 1-3), three nurses (RN 1-3), one AC (AC 1) and one housekeeper (HK 1). Participants were from different units across the home. For the interviews, a total of seven staff members participated, including three HCAs from unit A and B (HCA 4-6), two nurses (unit A and B, RN 4-5), one AC (AC 2) and the catering manager (CM1). A total of twenty residents/families were interviewed, of which seven were from unit A (BR 1-7) and the remaining thirteen from were from unit B (DR 1-13).

Staff in the focus group and interviews mostly discussed their responsibilities towards the residents and the processes involved in providing hydration care. All participants indicated that they were aware of the consequences of dehydration and noted infections (particularly UTI), kidney problems and death as potential complications of insufficient fluid intakes. They also recognised that not drinking enough, vomiting and diarrhoea as well as fever were the risk factors for the onset of dehydration. Some participants mentioned signs and symptoms which would make them aware that the residents could be dehydrated, such as concentrated urine and changes in residents' behaviour. All agreed that hydration was very important:

> *"I would say it's more important than, even giving some personal care…"* (HCA 3)

Staff mentioned that the care home had a set of procedures to ensure the residents were well hydrated, including frequent opportunities for the residents to obtain drinks, a wide range of fluid options and assisted the residents who need help. They also indicated that for the residents at risk of dehydration additional measures were in place such as providing frequent encouragement and recording fluid intakes in the charts. Residents did not discuss the importance of hydration, but instead focused on their needs and preferences and some expressed opinions that indicated the hydration care they received was not always adequate.

Three themes were identified from the staff and resident interviews (Figure 4.1); one of which related to the responsibility of providing hydration care for the residents. The remaining two themes concerned the barriers as experienced by staff (providing hydration care) and the residents (drinking).

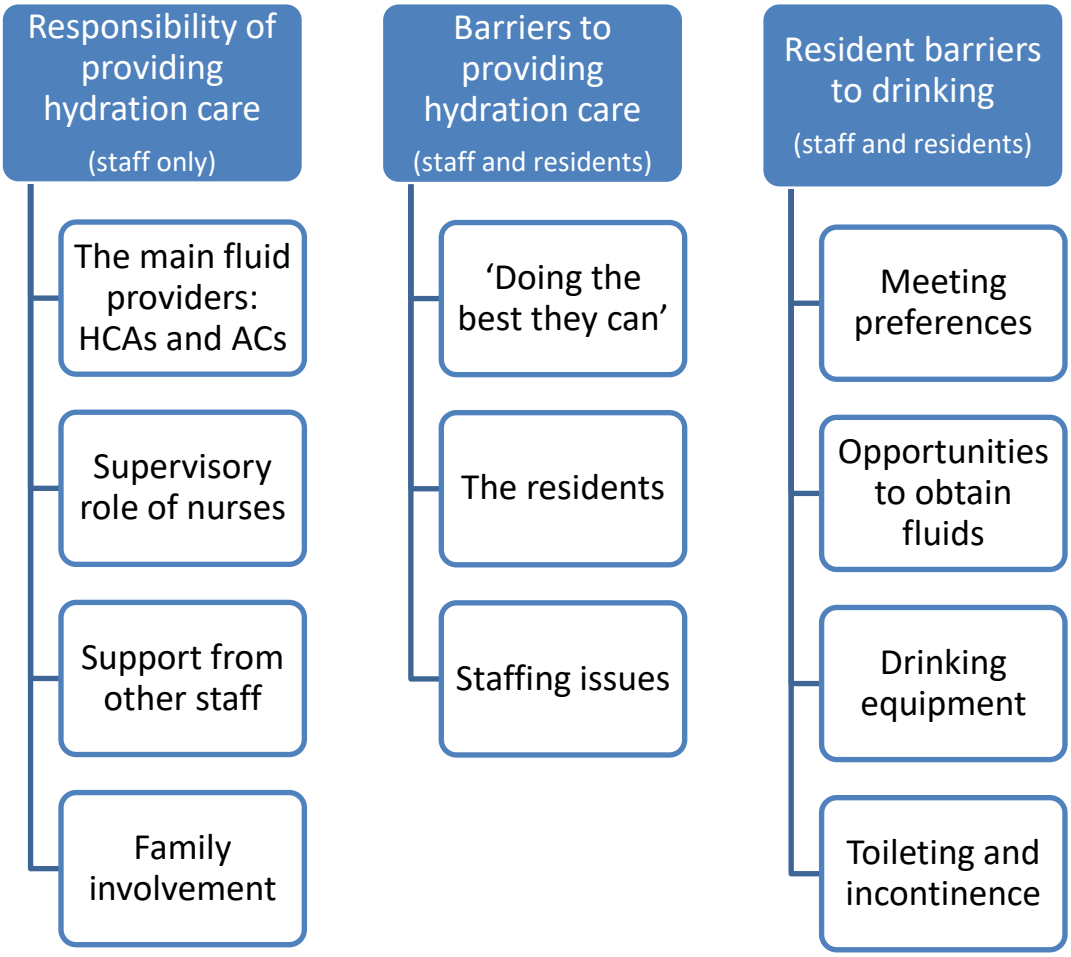

Figure 4.1: *Results of Thematic Analysis of the focus group conducted with staff and residents in exploratory phase: a map of themes and subthemes that emerged from the results*

4.3.1 Responsibility of providing hydration care

The main fluid providers: HCAs and ACs

Staff identified that HCAs were the main fluid providers for the residents. The HCAs suggested that drinking opportunities throughout the day were structured by the tasks set for them by the nurses. They mentioned that other staff participated in fluid provision, either directly or indirectly, but the task of hydrating the residents was assigned to them. There was some disagreement whether the responsibility of hydrating the residents was assigned to the HCAs. During the staff interviews, one HCA mentioned that they were allocated the residents for the day and that they were responsible for ensuring that the care needs of these residents were met throughout the shift. However, another HCA indicated that hydration care was everybody's responsibility and that they were serving drinks to all the residents on the unit, stating

"*We always work as a team"* (HCA 5)

Activity coordinators mentioned that they also had an important role in providing fluids for the residents. Activities were reported to be held twice a day from Monday to Saturday and the coordinators said all residents attending were given at least one drink during these times. Only activities in a café focused primarily on fluid provision. The coordinators reported that they needed to 'fit in' the drinks during the activities. They mentioned this included the outings, when the kitchen staff prepared drinks to be taken out or that sometimes they were also purchased at the venues. Staff also mentioned the importance of a café bar, which was run by ACs and was visited for socialising. The ACs felt that this social gathering encouraged some residents to consume fluids, with tea and coffee being particularly popular.

Supervisory role of nurses

Nurses stated that their role was mainly to supervise their team to carry out their duties, which also included hydration. Nurses said that they actively checked whether the residents were given drinks and if fluid consumption was documented. They also mentioned that they helped with giving fluids to the residents, especially at mealtimes and with medication; although they indicated that it was not expected of them to do so as a part of their job. As one nurse noted:

> *"But just for that extra piece of mind, I like to be around. And also, to go around to the rooms and assist the ones that are in need"* (RN 2)

Support from other staff

Participants also mentioned that kitchen staff played an important role in hydration care by delivering supplies to the units. It was reported that a kitchen aid came in every morning and restocked juices, milk and other food and drink items. However, there was a disagreement among the staff as to how efficient this system was and whether kitchen staff helped as much as they could. Some HCAs reported inconsistent practice, stating:

> *"I came today and there is nothing in the fridge…"* (HCA 1)

and

> *"… sometimes it's happened all the time…"* (HCA 2)

But others appreciated this service:

"But usually in the morning – um – the person who's helping in the kitchen is going through all the needs…" (HCA 3)

While the staff often mentioned that they were busy with many tasks and at time needed and expected help (e.g. family involvement discussed in the next section), they did not discuss looking for help from other members of staff. Domestic staff seemed to have no role in providing fluids, with a housekeeper stating that they were only responsible for cleaning and restocking domestic supplies. Nurses and HCAs said that that domestic staff or kitchen aids could not assist with fluid provision as they were not appropriately trained to do so.

"the reason is – uh – we are care staff are trained for manual handling of the elderly people" (RN 2)

Family involvement

All staff saw a potential role of the family in providing drinks for the residents. They noted that some family members took an interest in their relatives' hydration by giving them drinks and checking fluid charts to make sure they had drunk enough. However, some participants reported feeling frustrated that some family members demanded that the staff delivered the drinks to the residents rather than doing it themselves.

"They won't physically get up and pour it out, you know?! And I think, 'why can't you get up and get her a drink'?" (AC 1)

"You're coming in to see your relative, the girls are busy. If you're coming in, and you're coming in to see them, then you're coming in to help. If they need to drink, you get them a drink…" (AC 1)

Some staff also felt that family were often rude to them. They felt that they were doing their best and that confrontations were often unfair:

"They'll go berserk. And they don't ask them. They don't give them time to explain" (AC 1)

4.3.2 Barriers to providing hydration care for the residents

Staff discussed their experience of caring for the residents in care homes where they worked now and previously. They recognised that hydration was challenging at times

and they identified barriers to providing suitable care for some residents. Residents discuss this much, but they identified the time pressures of the staff as important barrier that affected the quality of hydration care they received.

Doing the best they can

Staff felt confident that the training and experience they gained working in a home were sufficient to care for different types of residents, including those with dementia and those at the end of life whom they found difficult to hydrate. They felt that the induction training and experience gained on the job provided them with the exact skills they needed to provide outstanding care. As one nurse stated about the training for the HCAs:

> *"We get them to be able to care for* (complex residents)*"* (RN 2)

While the staff felt confident in providing personal care, they also stated they were 'doing their best' looking after their residents. Some took this to a personal level saying that they cared for their residents as they would for their own family members.

> *"We are trying our best for the residents. Because we are trying to…In my opinion, I'm trying to care – uh – about the resident. Like I will care my mum… my grandma… like I would my family…"* (HCA 3)

When asked if there were any changes or improvements that could be made to fluid provision in the care home, all staff uniformly stated that they did not think so.

> *"We know…we know our task. We know what we need to do"* (HCA 3)

However, this perceived confidence in skills and their ability to tend to residents' needs could result in choices being taken away from residents:

> *"We know our residents better… what they like, and how they like a drink is one of them"* (HCA 1)

The residents

Staff identified the residents as the primary barrier for providing optimal hydration.

> *"We can't force* (them) *to drink…"* (HCA 2)

> *"…we can't open the mouth…"* (HCA 1)

Virtually all agreed that certain types of the residents refused the drinks no matter how much was offered. In fact, they reported that persistent encouragement made some residents more resistant:

> *"But the more you try and force them, you see, they won't do it"* (HCA 2)

Many of the issues raised by the staff concerned the residents who had some degree of dementia, and they often mentioned behavioural issues.

> *"…they're changing from time to time. If they are happy now, then this time after a few minutes they're crying, and after crying they're laughing"* (HCA 2)

They also noticed that while some residents flatly refused a drink, there were many residents who were not able to communicate but for whom it was easy to pick up the non-verbal cues indicating these residents did not want to drink any more.

> *"It's just you gotta sit at a time that they'd always – sort of – move their heads like that to let you know that they've had enough. That's their way of telling you, 'right, I don't want no more'…"* (HCA 1)

Staff discussed a few reasons the residents consumed inadequate amounts of fluids. Some indicated that those with dementia and at the end of life were tired or confused, and this made them particularly difficult to hydrate. One HCA noted that despite constant reminders, many residents were not able to comprehend the instructions given by the staff and that the information about the importance to drink was never retained.

> *"They don't understand the importance of having something to drink, about keeping hydrated"* (HCA 2)

Some nurses and HCAs mentioned that medication, sore mouths or acute illness often influenced how much the residents were able to drink. A few remarked that some residents restricted their fluid intake to avoid incontinence or the need for toileting and it was difficult for staff to encourage them to consume more drinks. Being unable to hold a drinking vessel or having swallowing difficulties were also highlighted as reasons for some residents not drinking enough. Staff did not specify whether these residents refused to drink or had physical difficulties which predisposed them to drinking insufficient amounts.

Fluid restriction was another reason some residents were not able to consume enough fluids. Participants, especially the nurses voiced their concern about this type of the resident. They stressed the importance of ensuring that these residents were given fluids, but that the amount was limited to whatever was advised by the doctor.

> *"…we know that we have been told not to give one thousand…more than one thousand five hundred. So, we limit them"* (RN 3)

Relationships between the staff and residents seemed important, with the staff recognising that some residents would only take fluids from a certain HCA. According to staff the team could purposefully send this HCA to the resident in the hope that they could persuade them to drink:

> *"Because sometimes the residents are…they like…let's say they like – um – (HCA 1). And – uh – don't like (HCA 2) to come to their room. So, the residents will drink from the (HCA 1), but he will not drink from the (HCA 2) … So then (HCA 1) go(es) in, then (HCA 2) going to different residents"* (HCA 3)

Participants also mentioned that some of these barriers could be overcome and that some residents needed different approaches. The most common strategy was leaving the drink with the resident and walking away. According to staff, many residents drunk in their own time and it was worth serving a drink, even if the resident said they did not want one.

> *"All we can do is just leave them on the table, and then when they're ready, you'll find that they just pick it up and start drinking anyway"* (HCA 2)

Some residents needed a little more help such as encouragement:

> *"…you just have to keep telling them… you have to drink"* (HCA 2)

…while for others distraction worked:

> *"…while she is talking, he doesn't realise that he is...taking the fluids"* (HCA 1)

Staffing issues

Staff shortage was an apparent barrier to providing adequate fluids, and the staff discussed this issue extensively. They felt that despite trying their best, they were

often faced with an inadequate number of staff on duty. Their feelings seemed to be directed towards the system that allowed inappropriate staffing levels rather than individual staff members not coming to work:

> *"…we're always short of staff…"* (HCA 3)

They observed that even if the unit was short staffed, they were still expected to maintain the same level of care. They also mentioned that low staffing levels in other departments could sometimes result in HCAs taking responsibility for tasks from other areas e.g. restocking the supplies. They recognised that this was when the quality of care was compromised:

> *"How can you give the best service if you're short staffed?"* (HCA 2)

Residents did not speak specifically about the staffing issues, but they did mention that staff were often busy and that sometimes they felt reluctant asking them for help. At times this had an impact on how much fluid they received as mentioned by one resident:

> *"…sometimes I feel like a nice cup of tea, but I don't ask for it because they are so busy"* (Resident, DR 2)

Quality of staff and their attitudes were also mentioned. All staff felt that there were many people who started working in a care home but soon realised that the job was not for them. The staff felt that many problems arose from the fact that these people did not like the job or did not realise how hard it was. They attributed this behaviour to the reason for frequent staff turnover that could compromise care.

> *"And a lot of people come to do a bit of training, then they realise that, 'no, I don't like caring', then they leave"* (HCA 2)

> *"I don't think people realise what a hard job it is"* (AC 1)

All staff agreed that problems they experienced could be resolved if the care home employed more staff and increased their wages:

> *"Just we need more staff and we're on about ten pounds an hour".* (AC 1)

4.3.3 Residents' barriers to drinking

Residents frequently discussed the barriers that prevented them to drink sufficient fluids. While at times, they could identify that their abilities could limit their fluid consumption, they provided examples how these could be rectified by a provision of adequate support. Staff often recognised the barriers for the residents to drink, however they perceived hydration care they provided as adequate to meeting resident needs and overcoming the barriers. Four subthemes were identified: meeting preferences, opportunities to obtain fluids, drinking equipment and toileting and incontinence.

Meeting preferences

Residents discussed that obtaining the drinks they enjoyed was important to them. They referred to a variety of drinks they liked to consume, with tea being a favourite drink mentioned by majority of the residents. Staff also identified that meeting individual preferences was important.

> *"Some don't like cranberry juice. They'd rather have orange or pineapple – you know?! Some of them drink the cranberry juice every day mind"* (HCA 1)

Furthermore, staff were able to identify some residents who responded to one type of fluids, such as one resident who only wanted to drink tea:

> *"He thinks I'm the tea lady, 'you coming with a cuppa tea'? … He drinks tea all day long"* (HCA 2)

Staff reported that the residents could choose from a selection of drinks available to them throughout the day. This included a range of hot drinks such as tea, coffee, hot chocolate, Horlicks and Ovaltine, a variety of juices (orange, cranberry, apple, pineapple and mango), milk, water, orange and blackcurrant squash. They also mentioned that the home provided a range of fluid rich foods such as custard, yoghurt, ice cream, jelly, fresh and tinned fruit, soup and gravy. Staff reported that these suited a range of special diets such as diabetic, vegetarian and modified consistency foods. Activity coordinators also mentioned that sometimes they ordered food and drinks specifically for activities. According to the catering manager, additional food and drink items were provided for special occasions such as birthdays or holidays and foods/drinks which were not normally available in a care home could be ordered on request.

Tea was mentioned as a drink of choice by most of the residents. Majority of the drinks that the residents liked were already supplied by the care home, including coffee, juices and hot chocolate. Many residents also stated that they enjoyed fluid rich foods, with ice cream and jelly being particularly popular. Drink dislikes were also commonly mentioned by the residents who highlighted the need to account for individual preferences. However, it seemed that the residents were not always aware that some fluids were available to them.

> "…*hot chocolate, but I never had it here* (resident was surprised when told this was available)" (Resident, DR 11)

Only a small proportion of the residents mentioned they drunk the same beverages every day. Most said that they welcomed a variety of drink options to be offered, but that they were not always given an opportunity to make a choice for themselves. For example, one resident discussed how he did not like the tea on a particular occasion and asked the staff for hot chocolate. Since then he was often given hot chocolate without asking, although he usually prefers tea. Another resident said that she preferred sugar, but was always given a sweetener because she was diabetic, while another said she preferred coffee, but was sometimes was given tea:

> *"…because tea is better for you".* (Resident, DR 8)

Staff recognised that it was important to offer different types of drinks because the residents' tastes and preferences could change, although they seemed surprised that this would occur.

> *"…you know, it's funny how they change. They go off on one thing, and then they want something else"* (RN 2)

Despite the staff acknowledging the importance of fluid preferences, the residents discussed that they were not always given the drinks they liked. This impacted their fluid intakes as a few mentioned that they consumed less fluids and were drinking different types of beverages to those they used to drink at home. One resident stated:

> *"I am not always being given what I like"* (Resident, DR 10)

…while another mentioned they did not like squash but:

"…I have to drink it". (Resident, DR 13)

Another issue mentioned by the residents was the quality of the drinks they received. This again seemed to depend on the individual preferences, with different residents wanting their drinks at different temperatures, strength or sweetness. They indicated that as with the types of fluids, they were not asked about the preferences when the fluids were served. One resident discussed how they stopped drinking milk because it was not served at the temperature she liked:

> *"I like my milk cold, but they gave me a warm one once when I asked for it"* (Resident, DR 12)

According to staff, every resident was assessed prior to admission with information being collected from medical notes, family and residents themselves. This information was used to ensure the residents had their needs and preferences met from the moment they arrived at the home. Staff mentioned that these were written in the residents' care plans and stored in the nurses' office. According to nurses it was their responsibility to become familiar with each resident's needs and disseminate this information to the HCAs. Staff also mentioned that residents were observed for a few days upon arrival at the home to ensure they ate and drank well, and to establish their eating and drinking habits. The HCAs mentioned that they were all assigned a role of key worker to the residents and it was their responsibility to establish these habits and report any changes to the nurses, who could update the care plans monthly or as required. According to staff, this system ensured that the residents were given what they liked.

The catering manager mentioned that measures were also taken to ensure steady supplies of food and drink. Orders were placed two to three times a week and were delivered overnight. Staff also mentioned that every morning and afternoon if required, the kitchen assistant restocked the units with drinks and other supplies. They also stated that these items could also be requested from the kitchen as required. According to staff, this system allowed the residents to have access to their favourite drinks at any time.

Opportunities to obtain fluids

Staff identified six structured opportunities for providing fluids for residents (summarised in Table 4.1). They reported that they viewed mealtimes as central to fluid provision, with 'tea rounds' or 'tea times' providing additional fluids to the residents:

> *"…that's a protected time for them not to be disturbed…"* (RN 2)

and:

> *"…we do know that during when they eat, they always* (get a drink)*…".* (RN 2)

Table 4.1: *Description of drinking opportunities available to the residents throughout the day, as reported by staff in focus groups and interviews.*

Opportunity	Time	Description
Drinks with breakfast	From 9am	Breakfast started by a nurse (unit A) or an allocated staff member (unit B). One HCA responsible for serving and assisting the residents in dining room (and occasionally the lounge), the rest of HCAs responsible for residents in their own rooms. Nurses to support HCAs as needed. Foods available: cereals, porridge, cooked breakfast. Residents given juice, tea, coffee or milk served individually as food is given.
Mid-morning tea	Not specified	The time for this activity was not specified; neither was it clear who was responsible for this to occur. Residents given juices, tea, coffee and biscuits as requested.
Drinks with lunch	From 12.45pm	An allocated HCA responsible for assisting residents in the dining room while others deliver meal trays to those in their own rooms. Nurses to help if needed. Foods available: cooked meal, pudding of the day (or ice cream as an alternative). Drinks available juices, squash, water, tea and coffee; given to individuals as needed.
Mid-afternoon tea	3.00pm	This was a responsibility of the HCAs allocated to this task. Tea and coffee made and distributed using the trolley; starting with the residents in the lounge and finishing with those in their own rooms. Nurses did not have a role in this task.
Drinks with dinner	From 5.00pm	Allocated HCA responsible for the residents in dining room while others allocated to residents in their own rooms. Nurses to help as required. Foods available: sandwiches, soup and other meals; one dessert available. Drinks available: tea, coffee, juices, milk and squash given individually as needed.
Evening drinks	After 8.00pm	By this time all residents were in their own rooms. Night HCA responsible for loading the trolley and distributing sandwiches, biscuits and hot drinks to all residents. Nurses did not have a role in this task.

Staff also reported that besides the six formal opportunities, residents could request drinks at any time. They mentioned that the drinks were provided to the residents in different locations on the units and that the residents could choose from the selection

available. They said that all HCAs and nurses were responsible for distributing the drinks and refilling empty glasses. Because of this routine, they were under an impression that drinks were always available and given at any time they were needed or requested by the residents.

> *"*(drinks) *they're just on-going whether they request or not…."* (HCA 1)

> *"And in the lounge is…the girls have always got the drinks out. There's always drinks poured out on the tables… so there's access to drink all the time"* (AC 1)

Staff also stated that HCAs were each allocated five residents per shift and were responsible for their food and fluid consumption. However, they also said that hydration was the team effort and that they were providing food and fluids to all residents as needed. Nurses said that they were less involved in fluid provision, but that they were responsible for allocating HCAs to individual residents as well as assigning them to certain tasks e.g. preparing afternoon tea or serving food in the dining room. Nurses also mentioned they were encouraging residents to consume fluids when doing the medication rounds. All staff mentioned that families and other visitors were encouraged to provide fluids for their relatives using the kitchenette available on each unit.

Activity coordinators reported that the residents who attended activities in the morning or afternoon also had opportunities to obtain the drinks around these times. According to ACs these were given to the residents individually as requested and the drinks available during activities were usually of the type provided by the care home. They mentioned that on occasions other drinks were purchased specifically for the activities, such as soft drinks for garden parties and barbeques. The ACs said that tea and coffee were usually served in the café and distributed as ordered by the residents.

One of the concerns that staff expressed was the inability to monitor residents' hydration outside the care home. Staff felt confident that residents on their units were well hydrated when remaining under their care, but they were not sure what happened to them when they left the home, e.g. when being taken to hospital. Staff

noted that residents could request drinks if they felt thirsty or that the escorting HCA would still offer fluids, but they felt this time outside of their care was uncertain.

> *"But I would say they miss the bulk of the on-going within the (care home)…"* (RN 2)

Opportunities to obtain fluids were also mentioned by the residents who, in contradiction to the perceptions of the staff, said that the drinks were not always available. They particularly referred to the availability of the drinks they liked to consume. A few residents mentioned that they liked a cup of tea when they first woke up in the morning, at bed time or with their meals, but they felt that these drinks were not always provided. They mentioned that the early morning tea was especially problematic because the staff were busy with other tasks. As a result, despite wanting a drink they did not always get one:

> *"I drink less than I used to (*when I was*) at home, you have to wait for your tea, you can't go make more"* (Resident, BR 2)

Many residents also mentioned that they had a preference when the mealtime drinks should be provided. Different residents wished to obtain their drinks before, during or after the meals and they thought their wishes were not always respected. On the other hand, some residents mentioned they did not mind when the mealtime drink was served but they did hint that this did not always occur or that they accepted the drink but would prefer to get it at different time.

> *"I will drink my tea with the meal, but I really like it afterwards"* (Resident, DR 12)

Additionally, some residents mentioned that the amount of drinks they received was not sufficient. A few residents said that despite obtaining a drink at some opportunities, they would happily accept another, but were frequently not given an opportunity to request them. This was mentioned in relation to drinks during and between the meals. One resident mentioned that he requested drinks in plastic mugs because they contained more volume, even though he did not like drinking from plastic. Despite this, he still did not think he received as much as he wanted. Another resident also discussed how her fluid consumption habits had changed since she

arrived at the care home, she also mentioned that she did not receive the drinks as frequently as she wished:

> *"…morning cup of tea; I do get one, but I would like more…".* (Resident, BR 7)

Another resident also mentioned that she was not happy with both, the quantity and the quality of the drinks provided:

> *"The kettle used to be always on in my house. I don't get that much tea, but also I don't like it here".* (Resident, DR 12)

Drinking equipment

Staff reported that the care home provided cups with saucers for hot drinks, glasses for cold drinks, and standard crockery such as plates and soup bowls for meals. For those unable to utilise standard equipment, the home also provided straws, plastic glasses, beakers, lipped plates and special cutlery. Nurses and HCAs mentioned that the residents and their families were also encouraged to bring their own equipment. Catering manager stated that all units were equipped with hot and cold taps, microwaves and blenders so the staff could make the drinks at any time.

Staff recognised the importance of providing an appropriate drinking equipment to the residents. They noted that some residents drank well, only if provided with the drinking utensil suitable to meet their needs:

> *"Someone may drink well, but not… in a glass… in a cup… use a beaker."* (RN 2)

> *"They will only…like with their drinking through a straw…"* (HCA 1)

The issue of adequate drinking equipment was also highlighted by the residents. The volume of the cup was identified as one of the barriers for the residents to drink adequate amounts, but more importantly they mentioned the difficulties they experienced when using standard cups and glasses. Many residents were not able to use the standard crockery because they found it heavy and difficult to handle. One of the problems they identified was a small handle of the tea cup, which would only fit one finger. This made the cup awkward to hold because the entire drink was balanced on one finger. Glasses were also mentioned by a few residents who thought they were too heavy and slippery to hold.

"He finds a tea cup too slippery, handle is too small, and it burns his fingers" (Daughter, Resident DR 7)

As an alternative, there were a few plastic mugs provided, but many residents did not like drinking hot drinks from plastic. They also emphasised the importance of preserving the dignity when choosing alternative equipment. Many residents were embarrassed using the beakers, and despite their difficulties were still were trying to use the standard cups.

"I spill a lot of drinks due to my condition, but I don't like beakers, I prefer 'normal' crockery" (Resident DR 7)

Consequently, many residents felt that the range of the drinking vessels provided by the home did not offer adequate support to meet their needs. Feedback provided by some residents revealed that many would welcome china mugs instead, especially if they were light and had a big handle.

Toileting and incontinence

Although the toileting and incontinence was not discussed in detail, staff recognised that this was an issue to some residents. They were able to identify a few individuals who refused drinks due to the fear of the frequent visits to the toilet or incontinence. They stated that it was particularly difficult to encourage these residents to drink:

"…and the problem is some of them don't like drinking too much 'cause then they keep going to the toilet" (HCA 1)

This was confirmed by the residents, majority of whom mentioned they enjoyed drinking, but that they were also worried about the incontinence and toileting. While some of the residents wore pads for protection, many were embarrassed by this and they wanted to use the toilet or a bedpan instead. Unfortunately, some residents mentioned that they could not always have a staff member attend to them when needed:

"Sometimes I worry that they won't come and get me on time". (Resident, BR 2)

As a result, many residents also mentioned that they actively restricted their fluid intakes to avoid incontinence or the need to go to toilet.

4.4 Discussion of findings and implications for the next steps

The focus group and the unit level interviews demonstrated that the staff perceived current system as effective for providing drinks for the residents. Staff also felt confident that they had adequate knowledge and experience to provide care for their residents and that they provided the best care. Staff saw a few challenges that prevented some residents from drinking, but these largely related to the residents themselves and the challenging behaviour the residents displayed due to their conditions. They also thought that staffing issues sometimes impacted on the quality of care they delivered. In contrast to the views expressed by staff, the residents felt that they were not always given the quality of care they needed. Interestingly, many residents indicated that they enjoyed drinking, but they encountered barriers that made the drinking experience less enjoyable. Challenges identified included limited opportunities to obtain preferred fluids, inability to make choices, inadequate drinking vessels and toileting issues.

This difference of opinions between staff and residents suggests that the staff may sometimes fail to recognise that the care they provide does not meet the needs of the residents. Staff may also be unaware of the institutional barriers that prevent them from providing adequate hydration care. This is supported by the finding that at times staff seemed to be unaware of the weaknesses in the systems that could impact hydration care they provided. An example of this was a discrepancy in staff responses regarding whether the responsibility of providing fluids for particular residents fell upon the individual HCAs or on the whole team. There were also examples where the staff were not clear on some procedures, including communication of the information and delegating some responsibilities. These could potentially have an influence on the efficiency of the fluid provision within the home. Considering that the response from the staff was unclear, it can be suggested that there were no clear policies in the home regarding these issues, or if they existed, they were not well communicated to the staff.

Additionally, interviews with the residents indicated that the staff did not always enable them to make choices. The examples included the residents stating that they did not always get the types of drinks they wanted and that some of the residents were not aware of all drink choices within the home. This is interesting because the staff themselves were able to recognise that different residents liked different types

of drinks. Without enabling the residents to make choices, they would not be able to provide them with fluids of their choice. The staff mentioned that they knew their residents well, which suggests that they thought they did not need to ask them about their preferences. However, they also mentioned that the resident preferences may sometimes change, which could mean that despite being aware of the importance of preference compliance, they did not always enable the residents to make fluid choices.

One interesting finding in this study was the staff describing difficulties in maintaining the fine balance of giving enough fluids to the residents placed on fluid restriction. Prevalence of older people on fluid restriction has not been researched in care home or any other setting, hence it is difficult to determine whether this would be a challenge for the staff in practice, although this has not been previously identified as a factor limiting fluid consumption in the older people or a risk factor for dehydration. Conversely, there were no residents who mentioned fluid restriction to be a reason affecting their fluid consumption. While the question related to this issue was not specifically asked, residents were asked whether they enjoyed drinking and if there were any reasons which prevented them to do so. This suggests that the impact of fluid restriction on resident fluid consumption was overestimated by the staff.

Staffing issues also emerged as a potential barrier to providing adequate hydration. This is possible, especially since the staff in focus groups identified that hydration is mainly provided by HCAs who are responsible for other tasks. This finding is also supported by residents who mentioned that they did not always request drinks because the staff were busy. Considering little and inconsistent help that they received from other staff groups, it is possible that despite trying to do their best, HCAs feel overwhelmed. They themselves recognised that if they were short staffed, it is not possible to provide the best care. Another finding is that staff feel resentful that the families do not offer assistance in providing drinks. This is interesting because it suggests that HCAs expect the families to be involved, but do not ask the same from other staff groups such as housekeepers whom they perceive to be ‘untrained’ and therefore not being able to provide safe care to the residents. It is not clear whether staff perceive the family to be able to provide safer care for the

residents, but this suggests that current systems discourage other staff to be involved in hydration care.

The barriers to drinking discussed by the residents were not recognised by the staff. Staff mentioned medical conditions and cognitive impairment as the reasons for inadequate fluid intakes of the residents, but they did not mention the importance of the quality of drinks and the experience of drinking, which were mentioned by the residents. During the discussions, the residents did not mention that access to fluids was of a problem but suggested that they did not get the drinks they wanted. This highlights the importance of providing preferable drinks to the residents. The residents also emphasised that the importance of preference is not limited to type of drinks and that the quality of the drinks and the type of vessels used also need to be considered.

There are some limitations to this study. Firstly, the interviews and focus groups only provide opinions of the participants and may not always reflect what happens. This study showed the evidence, which indicated that the perceptions of the staff and residents often differed. Data from other sources, such as observations would be more reliable. However, the perceptions of participants giving and receiving care, were still important to capture because they identified barriers experienced by both. Another limitation is a possible sampling bias. This especially concerns the selection of the residents whose cognitive and physical function enabled them to converse with the researcher. This may not be a good representation of this population. It is likely that those who are less able to express themselves, are also the type who are difficult to hydrate. For this reason, the opinions of the families were also sought, although they may not be fully aware of residents' current needs and preferences, they may also not know whether hydration care provided is adequate. As with any interview or focus group, the reporting bias was possible. This could especially be a problem when conducting a focus group with different levels of seniority of the staff. To avoid this problem, the focus group did not include managers and senior nurses and the residents were asked individually, but it is possible that the participants were cautious when giving their responses. Additionally, this part of the study did not seek opinions of other stakeholders who could possibly influence how hydration care is

provided. These could potentially include care home managers, owners and healthcare professionals who visit the home.

In conclusion, the results of this part of the study showed that opinions on hydration care and the barriers associated with it differ between the residents and the staff. It is possible that both, resident and care home related barriers exist. Staff focus group and the interviews identified gaps in current processes that could potentially influence the quality of hydration care provided. This finding was further supported by resident interviews, which suggested that this care was not always effective, resulting in diminished drinking experience for the residents. The results of this part of the study influenced the next steps where it was necessary to further explore the discrepancies between the opinions of both groups.

Chapter 5 Exploratory phase: Observations of current practice

Previous chapter identified barriers to adequate fluid intakes described by residents and care home staff. This suggests that providing hydration is complex and is not influenced by the residents refusing to drink. Hydration is perceived differently by staff and residents, but the results of the previous chapter suggested that hydration care did not always meet the residents' needs and preferences. The findings of the previous chapter were conflicting, hence further research was necessary to establish how care is delivered in practice. Participant observations offered a way to obtain objective data and provided a feasible alternative for exploring the discrepancies between the opinions of both groups.

5.1 Objectives

The purpose of this part of research was to map the patterns of current fluid provision and identify interventions to optimise fluid intakes. This was achieved by observing current practice to establish whether it met the needs of the residents and to determine how much fluid was offered to and consumed by the residents. This links to objective 2 of this thesis.

5.2 Methods

5.2.1 Setting

Observations were conducted on units A and B. Both units were intended to provide care for frail older people, although some residents on these units also had some level of cognitive impairment. The units provided care for 22 and 25 residents respectively. Unit A was a pilot site where most of the data collected was of qualitative nature, although some quantitative data was also obtained. Observations on unit A informed the development of the data collection tools on unit B. This unit served as a main study unit (described in this and the next chapter).

5.2.2 Data collection and analysis

Observations

On unit A, data were collected over a two-and-a-half-month period in summer. Initially, the unit was visited once or twice a week and the investigator engaged in a high level of participation, providing food and drinks to the residents assisting those

who needed help. During this time, field notes were taken, but no formal data collection tool was used. This allowed the staff and residents to get comfortable with being observed. These initial visits provided qualitative data and informed the construction of the structured schedules for observations. Following the initial phase, participant observation approach was still used, but the level of participation was minimal. This enabled collection of data on patterns of fluid delivery and fluid intakes of the residents. Following this, the observation schedules were refined, and new tools were used on unit B, where data collection was conducted over three days. Field notes from the diary were used throughout the observations on both units.

Two types of observations were conducted:

Unit wide observations:

These were designed to capture data on all residents present in a particular location (e.g. in dining room, sitting room or own room) for the duration of the observation episode (e.g. throughout breakfast or in the evening). Two separate observation forms were created to enable data capture during and between meals (Appendix 4). Observations were conducted from 6am to 10pm, a period when the residents were expected to be awake and when majority of hydration would take place. Quantitative data included how many residents were present for the duration of episode, number and type of drinks given including refills and who provided the drinks. Qualitative data included the type of drinks and equipment available on the unit and in the particular location, staff and resident activity, assistance offered by staff in relation to hydration and any barriers that prevented the residents to obtain or drink fluids.

Individual observations:

These involved observing individual residents to determine the amount of fluids (including fluid rich foods such as ice cream, jelly or soup) given, consumed and documented. Fluid consumption of the residents was compared to two standards of the recommended intakes: the minimum 1500ml recommended (Ferry et al, 2005) and the 1600/m^2 of the body surface area (Gaspar, 1988). Additional data included information adequate support that was provided to facilitate fluid consumption including helping the residents to drink, offering drinks in assistive cups, thickening fluids or prompting. Qualitative data comprised any observations related to hydration care. Observations covered periods between 6am and 9pm. Residents selected

included individuals from different categories of hydration typology (Figure 5.1) as described by Mentes (2006b), with a mix of residents who stayed in their own room and those who spent their days in communal areas, such as dining room and lounge. Residents were selected by the principal investigator, who was given the description of the residents by the nurse before the study commenced.

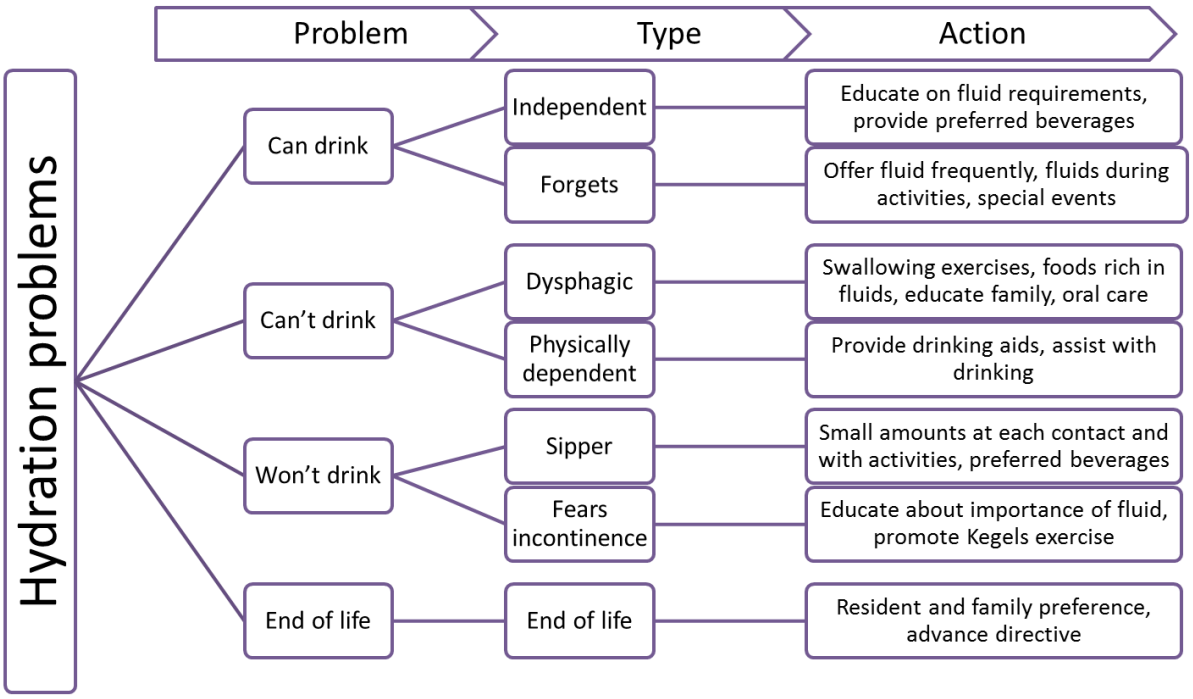

Figure 5.1: *Typology of resident hydration problems. Adapted from (Mentes, 2006b)*

Process Mapping

The purpose and conduct of process mapping were previously described in section 3.2.1.3. Process maps were constructed retrospectively based on the results of the observations. Process maps were then shown to the staff, residents and family, who were given an opportunity to feedback on accuracy of these. Since the process map in this study was constructed based on the findings from exploratory phase, the analysis of the process maps was not expected to produce any new data. For this reason, analysis of process map did not take place. Instead, staff, residents and family were approached individually for the second time, were guided through the maps, and were asked to comment about the reasons for inefficient fluid provision and consider possible interventions.

Action-Effect-Diagram

The AED exercise intended to include all stakeholders including managers, clinical staff, kitchen and domestic staff, residents and family, as well as the research team. The session was planned for two hours with a support from an experienced staff member from CLAHRC. The conduct of running the session and constructing the diagram were conducted according to the recommendations described in more detail in section 3.2.1.4.

5.3 Results: observations

A total of 98 hours of observations were undertaken, 53 on unit A and 45 on unit B. Unit wide observations provided data for 132 resident episodes. A resident episode was defined as one resident in one location for one period of observation (e.g. one resident in dining room at breakfast). Mealtimes comprised 42.4% (56/132) of resident episodes. For 72/132 (55%) of hydration episodes, residents had a drink present before the observation period started and additional 24/132 (18%) had more than one drink. There were 32/132 (24%) episodes, when the residents did not have a drink present before the observation started, and for remaining 4/132 (3%), it was not possible to establish if they had a drink (i.e. they were transferred from another location).

Individual observations provided data on fluids served, consumed and documented for eight residents. Resident typology as described by Mentes (2006) was difficult to assess. Typology often overlapped, as evidenced with two residents who had swallowing difficulty and required full assistance with eating and drinking. As a result, a simplified classification of the residents was adopted and used throughout this research. This classification was based on a level of assistance required by the residents and included those who were independent, required prompting and required full assistance to drink (Box 5.1).

5.3.1 Resident fluid intakes

Results of the individual observations conducted over three days in eight residents demonstrated that fluid intakes were low (Table 5.1). There was only one resident who consumed the recommended 1500ml of fluid, while three residents (38%, 3/8) consumed less than 1000ml. The one resident who consumed the recommended minimum amount of fluid was supported by the family, who provided 1275ml of the

1500ml consumed. Fluid intakes compared to the requirement calculated from the body surface area were low and on average met 30.3% of the target (min-max 15.1% to 57.2%). Resident level of dependence, as well as location, determined the amount of fluids consumed (Table 5.1).

Residents who were fully dependent on others consumed the least amount of fluids.

Box 5.1: Resident typology

- *Independent:* Can drink independently without support or encouragement
- *Needs Prompting:* Can drink independently but requires encouragement or reminders to consume their drink
- *Needs assistance:* Relies on staff for the provision and consumption of drinks

These residents were consuming most of their drinks at mealtimes (83%) and a large proportion of fluid (50%) was derived from fluid rich foods (Table 5.2). The residents who stayed in their rooms consumed slightly less than residents in communal areas. One resident who required assistance and stayed in their own room consumed only 450ml of fluid throughout the day. Swallowing difficulties and prescription of thickeners did not seem to influence the amount of fluid consumed. Two residents who were on thickeners but were able to drink independently consumed over 1000ml each. Both residents spent their days in communal areas.

Table 5.1*: Fluids consumed by different types of residents and different locations. * Resident with swallowing difficulty, ¤ Resident given 1275ml by family member, § Two residents with swallowing difficulty, consumed 1190ml and 1200ml.*

Type of resident	own room		dining room/lounge		Total	
	no of residents	mean fluid intake	no of residents	mean fluid intake	no of residents	mean fluid intake
Independent	2	960	3§	1150	5	**1072**
Needs prompting	1¤	1500	1	605	2	**1052**
Needs assistance	1*	450	0	-	1	**450**
Total	**4**	**965**	**4**	**1013**	**8**	**989**

Table 5.2: *Differences in the amounts of fluids offered and consumed stratified by different types of the residents. *One resident given 1250ml by the family.*

Type of resident	no of residents	Mean fluids offered (ml)	Mean fluids consumed (ml)	% of fluids consumed	% of fluids offered at mealtimes	% from food	No of drinks offered
Independent	5	1885	1072	57%	60%	27%	10
Needs prompting	2*	1775	1052	59%	35%	10.8%	12
Needs assistance	1	600	450	75%	83%	50%	4
Total	**8**	**1461**	**989**	**68%**	**57%**	**26%**	**10**

5.3.2 Fluids served to the residents

The average fluid offered to the eight residents was 1461ml (Table 5.3), but this amount varied greatly between the residents (min-max 600ml to 2425ml). Only three of the eight observed residents were offered fluids meeting or exceeding the recommended 1500ml. One of the residents who received more than this amount was given a half of the fluids by the family. There seemed to be no difference in the amount given to the residents who were independent or needed prompting, but the residents who needed assistance were given less fluids. After excluding the resident who was supported by the family, there was also a noticeable difference in fluids served between the residents who were in communal areas (1439ml) and the residents who stayed in their own rooms (1170ml). A resident who stayed in their own room and required full assistance was given only 600ml of fluids.

Table 5.3*: The amount of fluids served to the residents.*

Type of resident	Own room		Dining room/lounge		Total	
	No of residents	**Mean fluid served (ml)**	**No of residents**	**Mean fluid served (ml)**	**No of residents**	**Mean fluid served (ml)***
Independent	2	1455	2	1228	4	1341
Needs prompting	1	2425*	1	1900	2	2162
Needs assistance	1	600	1	1400	2	1000
Total	**4**	**1484**	**4**	**1439**	**7**	**1461**

* 1275ml of fluid was provided by the family

5.3.3 Reasons for inadequate fluids served and consumed

The quantitative and qualitative data shown below illustrates that there were limitations to hydration care, which influenced how much fluid was served to the residents. These factors included time and location where drinks were given, how fluid intakes were monitored and how work organisation made it difficult for staff to provide adequate fluids.

Limited opportunities to obtain fluids

Unit wide observations showed that the residents were not given drinks at all opportunities. Most drinks were given during mealtimes with 44/56 (78.6%) residents receiving a drink during the meal as opposed to between meals when only 24/76 (31.6%) residents received one (p=0.000). All residents were given drinks at breakfast (100%), but at other meals some residents did not receive the drinks (Table 5.4).

Breakfast was also the time where the residents were more likely to receive more than one drink. After this time, the proportion of residents receiving drinks declined. Number of drinks given also declined with less drinks given to the residents as the day progressed. The exception was the mid-afternoon, when the residents received their afternoon tea. There were certain times of the day when fluids were given to none or very few residents. This was especially noticeable in the early and mid-morning periods when staff were observed to focus on tasks related to personal hygiene such as washing and dressing.

Field notes on unit A suggested why drinks were not always provided. It has often been observed that the residents were sitting in the dining room long before the meals started but had nothing to do to occupy themselves during this time. Early in the morning, residents were sometimes brought to the dining room as soon as they were washed and dressed for the day and were waiting for half an hour or longer before mealtime started. It was often observed that the residents did not get the drink until they were eating, and some residents were not given a drink at all. During lunch and dinner, it was frequently observed that the drinks were only served after the resident have eaten.

***Table 5.4**: Number of residents receiving drinks and the number of drinks per resident stratified into the period of observation and the location of the residents. Residents were most likely to receive drinks at mealtimes (p=0.000) and those in communal areas were more likely to get more than one drink (p<0.05).*

	Own room			**Lounge/dining room**			**Total**		
Period	**no of residents**	**no (%) of residents receiving drinks**	**no of drinks/ resident**	**no of residents**	**no (%) of residents receiving drinks**	**no of drinks/ resident**	**no of residents**	**no (%) of residents receiving drinks**	**no of drinks/ resident**
Early morning	8	0 (0%)	0.00	0	n/a	n/a	8	0 (0%)	0.00
Breakfast	5	5 (100%)	1.40	9	9 (100%)	1.67	14	14 (100%)	1.50
Mid-morning	15	0 (0%)	0.00	8	1 (12.5%)	0.13	23	1 (4%)	0.09
Lunch	10	6 (60%)	0.80	11	10 (91%)	1.27	21	16 (76%)	1.05
Mid-afternoon	15	8 (53%)	0.53	9	7 (78%)	1.22	24	15 (63%)	0.79
Dinner	11	10 (91%)	0.90	10	8 (80%)	1.00	21	18 (86%)	0.95
Evening	19	8 (42%)	0.53	2	1 (50%)	0.50	21	9 (43%)	0.52
Total:	**83**	**37 (45%)**	**0.52**	**49**	**36 (73%)**	**1.06**	**132**	**73 (55%)**	**0.72**

Refills or additional drinks not provided

Once the residents were given drinks, they were not observed by staff to determine if they needed more drinks. Refills or additional drinks were rarely given. At the same time, there were some residents who needed encouragement or reminders to drink, but this was not always recognised. Staff also missed the cues sent by the residents who could not communicate. For example, at one time it was apparent that the resident was thirsty as she was picking up her empty glass and trying to drink from it. In this instance, the HCA who was working in the dining room did not notice the resident. This gentle cue could easily go unnoticed in a busy location such as a dining room, but some residents who were able to communicate were still not given a drink. In one instant a resident asked the HCA for a cup of tea and this was acknowledged, however five minutes later she was taken to the lounge and the tea was not given.

Similar situation was observed in a lounge at breakfast. One resident asked for another cup of tea, which the nurse acknowledged and promised the resident to bring, but she did not return. This created a problem because a few minutes later the resident was agitated and was persistently shouting for tea, which was not delivered for another ten minutes.

Often, at the end of the meal residents were asked if they were finished, plates were taken away, and residents were moved to the lounge. Most of the time drinks were not offered around this time, neither before nor after the move. Residents were placed in the same spot in a lounge as they were sitting before the meal, hence many were placed in front of the drinks that they left behind when they were transferred to the dining room. These were mostly squash and water.

Sometimes it was found that drinks were actively restricted because staff hoped that doing this would result in residents eating their food, as recorded in field notes:

> *"I was helping the staff out in the dining room. I asked one resident (able to communicate and ask for anything) what drink she wanted. She asked me for a tea. I made a big pot and went around and offered tea to other residents (I also made a couple coffees for those who wanted this instead). I was approached by the nurse who said they usually didn't give people tea with lunch as this will prevent them to eat. Not sure I understand the rationale*

behind this, they are given squash – is it just better because it never gets drunk? The one resident she was particularly concerned about (I know, he frequently refuses food) had half a cup of that tea by the end of lunch and barely ate his food (the nurse said to me: 'I told you so…')"

On this day at lunch, there was only one person who was drinking squash, which was usually the most prevalent drink on the tables in the dining room. It was not possible to determine whether this was because residents preferred the hot drinks or whether the staff decided not to offer any more fluids.

Similar missed opportunities were observed in the lounge: drinks were not offered before or after the meals, residents were not monitored to see if they needed refills and if the resident requested drinks they were not always provided. As opposed to the residents who were moved to dining room and had to have a drink offered; the residents in a lounge sat in front of the tables where the drink was already provided. This meant that the residents were less likely to be offered drinks other than water and squash already on their tables.

No fluids were provided before or after the meals for the residents in their own bedrooms. If the resident obtained the drink with the meal, it was brought to the room on a tray, but frequently, meal trays did not have drinks on them. This meant that the residents were mostly given what was available in the jugs in their rooms. Some residents had drinks on their tables, but when these were drunk, they were not always refilled when the food tray arrived. This was observed for all three mealtimes, and even at breakfast the hot drinks were sometimes missed. Some residents also had fluids available, but these were not easily accessible, especially if the residents were in beds.

Between meals in a lounge, drinks were not always given or refilled. In the morning, the residents were brought up to lounge as early as before 6am, but rarely received the drink. One early morning, tea and coffee were served to the residents by one resident who was self-caring. Afterwards she noted that she usually did not have access to the kitchenette around this time. There was a routine of refilling or giving drinks shortly after the residents were brought from the dining room after lunch or dinner. The drinks would include either squash or water and were not given to the residents who were already sitting in front of one. Additionally, if a resident was

brought to the lounge after this time, they missed the opportunity to obtain these drinks and had to wait until the next opportunity. Tea time around 3pm was the only time apart from mealtimes when residents were provided with hot drinks. Refills were sometimes offered, but only on squash and water and not to everyone. In one instant it was observed that a nurse refilled a glass for one resident for whom she was giving some medication but did do this for other residents who finished their drinks. On another occasion it was observed that one resident asked for a drink and the HCA brought it but did not acknowledge that six other residents had empty glasses in front of them.

Many residents were transferred to beds shortly after dinner. When drinks were served in the evening by the night staff, most residents were asleep, but nobody was woken up and those who required assistance were not offered any. As a result, only few residents benefited from the drink and snack around this time. This also meant that many residents were not given any drinks between dinner and breakfast. It was also frequently noticed that the table with a drink was moved away from the resident's bed when the staff provided personal care and was not returned to the bedside upon completion of this task.

When requesting drinks, residents would generally be given what they wanted. However, many residents did not have an ability or opportunity to communicate their needs. Even when the residents requested the drinks, these would not be given straight away. On few occasions, the resident requested a drink, but it was not brought. This is potentially a missed opportunity as the residents would likely have drunk more if the drinks were provided at these times. Sometimes it was also observed that staff were providing a drink to calm some residents down, therefore clearly recognizing that the drink was needed. As evidenced in field notes on two occasions:

> *"One resident was shouting for a long time, after a while she was given a drink. She drunk it quickly and wanted some more, but at this point all HCAs have left"*

> *"One resident given some drink after she's been making some noise for a while"*

Similar patterns were observed for the residents in their own rooms. If the residents had drinks on their tables in the morning, these were either squash or water leftover from the previous day or the night, no tea or coffee was provided.

The best opportunities for obtaining fluids were available for the residents going to the café. As the residents arrived, they were greeted by the ACs and asked whether they wanted tea or coffee. The residents were also offered refills, some declined but a few happily drunk two or three cups. However, even in café it was observed that there were few residents who were also not asked if they wanted additional drinks, even though they were sitting with empty cups for a long time.

Location of the residents

Residents who consumed their meals in the dining room had more opportunities to obtain fluids. Residents who stayed in their own rooms obtained less drinks as a result had smaller amounts of fluids offered to them (Tables 5.3 and 5.4). Similar trend was observed with the residents who stayed in lounge at mealtimes. Since most of the residents were transferred to the dining room, there was little supervision for the residents who stayed in the lounge. On one of the early days of observations on unit A, there were three residents who stayed in lounge for lunch, and while they had their glasses refilled before meal with either water or squash, they were not provided with any other drinks afterwards and were not offered any additional drinks at dinner either.

Residents who stayed in their own rooms had the least opportunities to obtain the drinks. Breakfast was the only time when the residents got hot drinks. Hot drinks at breakfast were delivered on the tray with the meal. The drinks given to the residents at lunch and dinner were squash or water poured from the jugs available in the rooms and no drinks were observed to be taken on the trays at lunch and dinner. No drinks were offered immediately before or after the meal. After breakfast, there was only one resident who was given a cup of tea and a glass of mango juice. This resident was able to communicate their needs and requested the drinks from the staff by using a call bell. Residents in their own rooms were also less likely to be offered a drink between meals. When they did receive the drinks, these were mostly refills of water of squash from the jugs available in their rooms. Hot drinks were generally offered either at breakfast, afternoon tea or the evening. However, if the

residents were asleep, they would miss their opportunity to obtain these drinks. While there was a tea round at 3pm at which time the residents were served either tea or coffee, there was no mid-afternoon tea round, which was mentioned by staff in the interviews.

Resident typology

Residents who required assistance were offered less fluids and received a higher proportion of fluids at mealtimes (Table 5.3). Observations on unit A also showed that residents who required assistance were frequently not offered drinks at 3pm afternoon tea or with the evening snack. Staff were often observed to distribute the drinks only to those who they knew were able to reach for the cups and consume fluids by themselves. During the meal, these residents would be given a drink after they have eaten or sometimes not at all. Residents who required prompting received their drinks but were often found not to consume them.

Staff were observed to be able to identify the residents who required assistance, but not those who required prompting. This disadvantaged some residents, because while they were enough fluids, they were not able to consume them independently. Furthermore, it was noticed that at times, the residents' conditions as well as their location determined the level of assistance they required. For example, one resident who needed prompting sometimes required full assistance to drink. There were also some residents who were able to drink independently when sitting at the dining room table but required full assistance when they were in beds.

Not meeting resident fluid preferences

Drinks provided to the residents did not always meet their preferences. The drinks most frequently offered were tea (54.5%), squash (21.6%) and water (10.2%).

The type of drinks given to the residents differed depending on location, with the majority of drinks in the dining room being squash and tea (52% and 40% respectively) and tea (61%) in the other locations. There was no significant difference in the number of hot drinks and juices given in the dining room and the other locations. Overall, the most common drinks given at mealtimes were tea, squash and water (Figure 5.2). Squash and water, which were the most prevalent pre-observation drinks, were given less frequently than tea. They were observed not to be drunk by the residents and were present for prolonged periods of time.

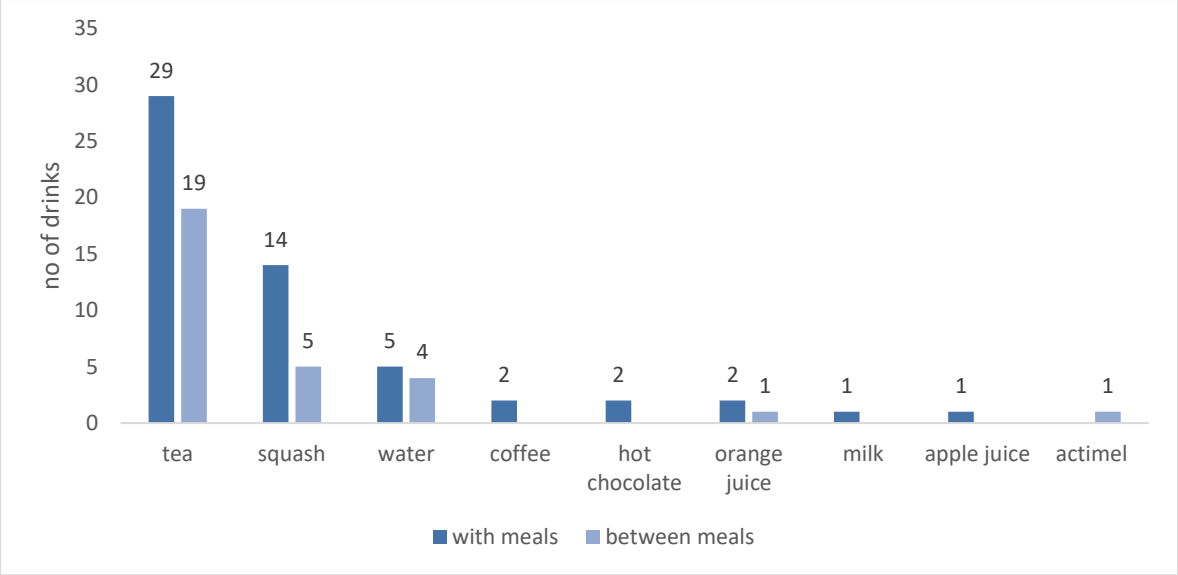

Figure 5.2: *Type and number of drinks given to the residents with and between the meals (n=56 and 76 respectively).*

There was little communication between the staff and residents regarding their preferences. Of 51 resident episodes when it was possible to establish whether residents were given a choice, staff asked about fluid preferences 15 times (29.4%). All instances were at mealtimes and residents were asked 11/23 times (48%) in the dining room and 4/17 times (23.5%, p=0.008) in their own rooms. Most of the times, the residents were not given a choice with staff placing a drink in front of them without asking what they would prefer to drink. Sometimes the HCA would tell the residents what was being given. This was observed in all three locations. In dining room, squash and water were usually provided because of their availability at hand's reach. Each table in dining room was set with either a jug of squash or water. Other drinks such as juices were available in an adjoining kitchenette. As noted in the field notes:

> *"When staff provide the fluids, it is usually those that are at the moment most convenient to get, e.g. if a jug with red squash is on a table, people at this table will get red squash, those at the next table with water in a jug will get water. Preference is not taken into account".*

When queried about the juices, staff responded:

> *"They don't like juices, they find them too strong, squash is better…"*

Likewise, drinks provided to the residents in the lounge and their bedrooms were the ones most easily accessible. There were jugs of squash and water on the tables and they were usually served to residents. Staff did not ask the residents if they wanted any other type of drink and refilled the glasses if they were empty. When hot drinks were served, these were made individually in the kitchenette and delivered to the residents on a tray or one by one. Residents were given tea or coffee depending on what the staff perceived the residents to prefer.

> *"I am not sure if anybody actually got their choice of coffee or tea, I know at least one person who likes coffee, but got tea instead"*

> *"None of the residents were asked and just given tea, only one got coffee, I know at least two more residents that prefer coffee to tea"*

On one occasion, a member of staff recalled speaking to the family and found that the resident really liked fruit but was not given any. This preference was also not documented within the care plans.

Staff had also varied opinions on the type of food and drink residents could consume. Confusion with diabetic residents was one of the examples. Depending on the views of the individual staff members, certain drinks or food items were withheld for the residents with this condition. There was no systematic approach to provide food and drink to diabetic residents. Some staff were observed to give the residents cakes and sugary drinks, while others did not allow even a piece of fruit to be given. On few occasions it was observed that the residents would have their favourite drinks withheld only to be given a piece of cake later.

Lack of choice of possibly determined whether drinks were consumed by the residents. Water was not popular with residents and only 17% of the amount offered was consumed (Figure 5.3). Drinks that were found to be entirely consumed were hot chocolate and apple juice. Apple juice, which was given twice was provided by a family member, and the hot chocolate which was given once was requested by the resident, but they were not routinely served to the residents.

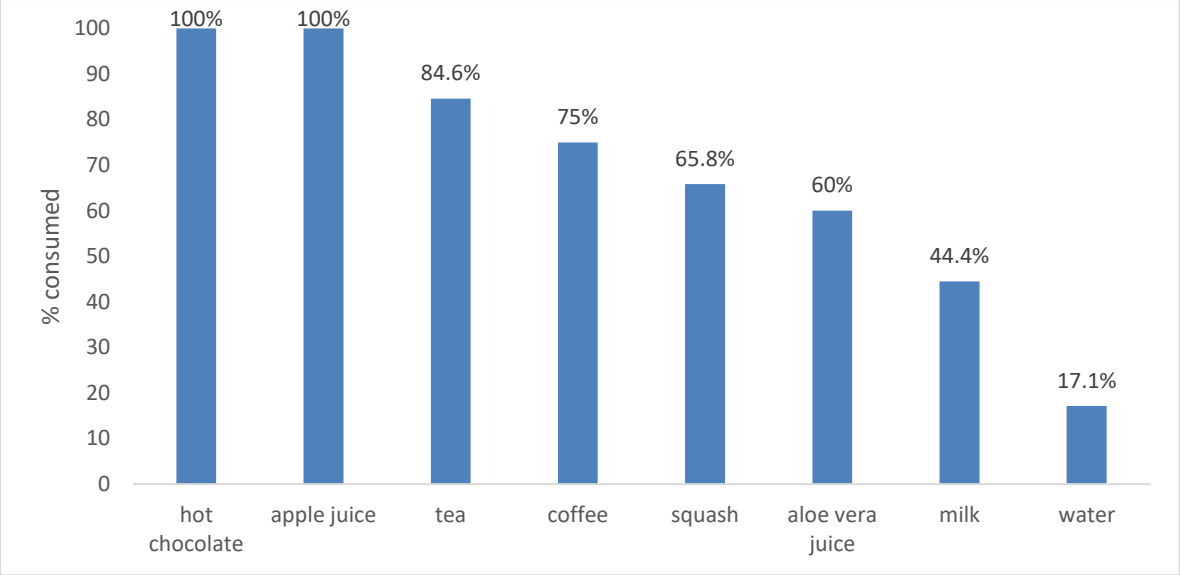

Figure 5.3: *Percentage of different types of drinks consumed by the residents.*

Residents were more likely to be offered a choice of drinks when they were in a café. When the residents arrived, they were asked what they wanted to drink and how they liked it (e.g. sugar or milk), although it was not clear whether special requirements were communicated with ACs. Most of the residents did not arrive with their files and there was little communication between HCAs and ACs regarding the residents. Some residents were transferred to the café with their own drinks or their own mugs, which possibly reflected their needs or preferences. However, there were many residents who were not able to visit the café and were not able to take advantage of these facilities.

Provision of fluid rich foods

Across the whole unit over three days. There were 49 fluid rich foods given to the residents and all except one (yoghurt) were given at mealtimes. On average during mealtimes the proportion of residents who received fluid rich food was 67% (38/57) (Table 5.5). Fluid rich foods were mostly served at dinner when 90% (19/21) of the residents received at least one portion. At lunch and breakfast, the proportion of residents receiving fluid rich foods was less (57%, 12/21 and 50% 7/14 respectively). The proportion of residents receiving fluid rich foods was similar in own room and lounge/dining room. Residents did not usually receive more than one fluid rich food during each episode of hydration care, this occurred for 24% (9/38) of the episodes.

***Table 5.5**: Fluid rich foods served at mealtimes*

	Own room			Lounge/dining room		
	No of residents	**No (%) of residents receiving fluid rich foods**	**Types of fluid rich foods served**	**No of residents**	**No (%) of residents receiving fluid rich foods**	**Types of fluid rich foods served**
Breakfast	5	2 (40%)	Porridge, cornflakes	9	5 (55%)	Porridge
Lunch	10	5 (50%)	Yoghurt, custard, curry with milk	11	7 (64%)	Custard, fruit, yoghurt
Dinner	11	11 (100%)	Yoghurt, soup, mousse	11	8 (80%)	Yoghurt, crème caramel, soup, fruit
Overall	**26**	**18 (69%)**		**31**	**20 (65%)**	

The most common fluid rich foods offered were soup and yoghurt, which constituted 22% of fluid rich foods each (Figure 5.4). As with drinks, residents were no asked about preferences when these were served. Ice cream, which along with jelly was previously identified by the residents to be their favourite fluid rich foods (Section 4.3.3) was only served once to one resident. Jelly was not available during the observations. Upon examination of the menu provided by the chef (Appendix 5), it was discovered that ice cream and jelly were only available once and three times respectively in a four-week period. Fluid rich foods offered during mealtimes were those that were sent from the kitchen together with meals. According to staff, the alternatives were only provided if the residents who complained.

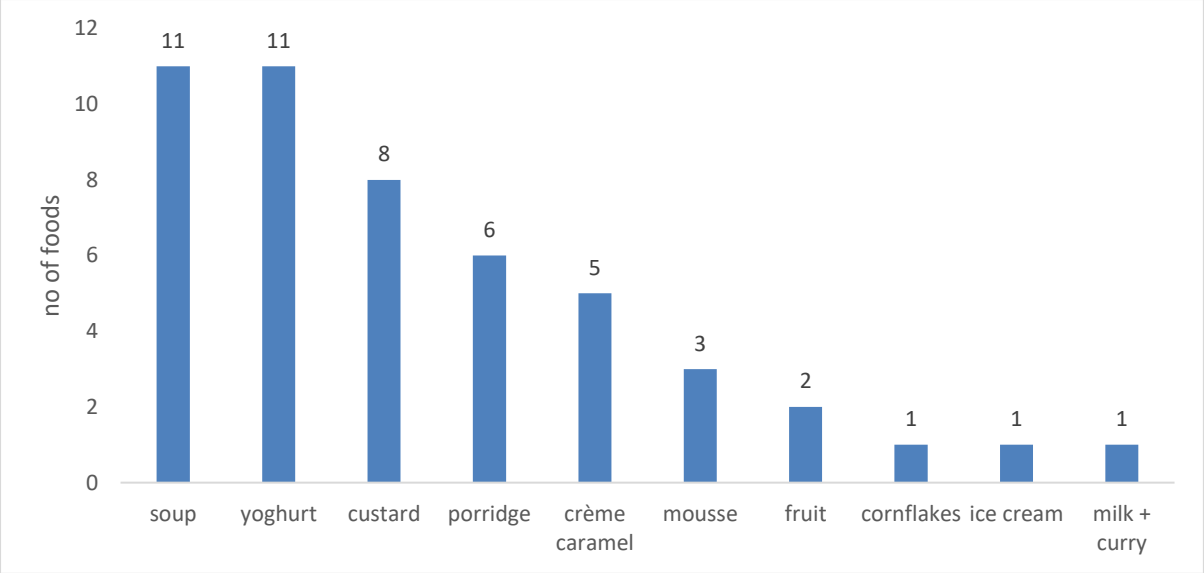

Figure 5.4: *Frequency of different of fluid rich foods given to the residents (n=48 at mealtimes and n=1 between meals).*

Drinks out of reach

At all times, jugs with squash and water were on tables for the residents, but many had empty glasses and could not refill them without assistance. Refilling drinks after mealtimes, which was a routine in the lounge, did not generally happen in resident rooms. Many had to wait until the next time a staff member walked into their room to have a drink. Some residents were only visited at meals, which meant they only had three opportunities for these drinks to be refilled. It was frequently observed that the residents had the drinks, but they were out of their reach. This appeared to be particularly common in the bedrooms during early morning and in the evening.

While the drinks were sometimes on the tables, the tables were pulled away from the beds and out of reach. On other occasions the tables were so low, that the drinks were not visible to the residents. This could have been done accidentally as observed with a domestic staff who moved the tables during cleaning. For some cognitively impaired residents however it was observed that the drinks were placed out of the reach to prevent spillage. Other items on the tables such as urine bottles obstructed the view and prevented the residents from reaching for their drinking vessels.

Insufficient assistance

Hydration care affected different types of the residents because of insufficient assistance they were provided with. Independent residents were often found to have no drinks available to them, usually because they were not refilled or served on time, or because they were out of reach.

For those who needed full assistance, the opportunities for the drinks were limited and they received most of their drinks at mealtimes. They frequently missed afternoon tea, either because they were not provided with a drink at this time or because the staff did not spend enough time for them to be able to finish. Similarly, food was not always consumed by these residents, which impacted on their ability to obtain a dessert. Residents who needed assistance with feeding were usually given small portions, and since it was assumed they could not each much, the soup or dessert was usually not offered. This affected mostly the residents the lounge and their own rooms. Residents who had their meals in dining room were in general more independent than those who stayed in their bedrooms. Some residents required prompting, although this was not always recognised or acted upon.

In the bedrooms, when the residents were given meals, they were not supervised to eat and drink unless they required assistance. They were not prepared for the meal until the food was brought. It was frequently observed that the resident was woken up and the headrest was raised when the HCA brought a tray to the room. As a result, residents were not adequately positioned to eat and drink, which could have influenced the amounts of fluid and food consumed, but also could put some at risk of aspiration.

One problem observed in the lounge was the toileting. During the day, there were no scheduled opportunities for toileting and the residents had to ask a staff member to be taken. On some occasions the residents had to wait for a long time because there were no staff present to communicate this or the staff were busy and asked the residents to wait. Sometimes they would get busy and forget about the request. It was also observed that sometimes residents were taken to the toilet and were not returned to the lounge. The issue of toileting did not emerge in observations of the residents in their own rooms.

Staff were observed to rush through all the tasks throughout the day. The shift started at 8am and the HCA were trying to get as many residents washed and ready for breakfast as possible. Breakfast was sometimes delayed, and the staff rushed through, so they could finish washes before lunch. Afternoon was the time when the staff took their breaks and started changing incontinence pads. Many residents were put to beds around this time too. The remaining residents were put to beds shortly after dinner and when this task was finished, the staff started writing the nursing notes, fluid chart records and other documentation. It was observed that during and after documentation was completed, staff did not provide any care to the residents. HCAs were observed talking to each other, watching TV or checking their phones until the shift finished. It was also noticed that if residents needed any care around this time, they had to wait for the night staff to provide it.

Unsuitable drinking equipment

As with drink preferences, drinking vessels were not always considered when drinks were served. Drinking vessels were already on tables in dining rooms and were used for giving drinks to the residents regardless of their needs, same equipment was provided in a lounge. Small teacups were used for serving tea or coffee in both locations. In own bedrooms, residents were provided either with a beaker or a plastic tumbler and other crockery was rarely used. As reflected in the field notes. Some residents had their own mugs or other drinking vessels provided to them by the family. With exception of two residents who had specialist dysphagia cups, resident own drinking vessels were not routinely provided to the residents.

Inadequate monitoring

Inadequate monitoring impacted both, the amounts served to and consumed by the residents. Staff were not allocated to the residents to provide them with fluids. Hydration care was considered a team's activity where everyone was responsible to offer drinks to all residents. However, the staff mostly concentrated on other tasks and did not give hydration care enough attention. Mealtimes were generally focused on eating while the times between meals were mostly devoted to personal hygiene. Even the afternoon tea, which intended to provide drinks was rushed so the staff could get their breaks or start the 'pad rounds'. At these times, staff assumed that even if they did not give the drinks to all residents, these will be offered by another staff member. As a result, staff were not aware that the residents frequently missed

their opportunities to obtain fluids and hence they did not realise that the amounts of fluids they offered were not adequate.

Fluid intake charts were in place for a small proportion of the residents who were considered at risk, but it was not clear how the risk was assessed. Of the eight residents who were observed for fluid consumption on unit B, three had their fluids documented. The entries within the fluid charts did not correspond with the data obtained by the observations. Some drinks were not recorded, while different ones were added to the chart, often at incorrect times. For example, one resident had a tea recorded as given at 9am, but she was only woken up and given breakfast at 10am and was not offered a drink. For the other resident, a cup of tea was given with dinner, but this was not documented. For one resident, the amount of fluid was totalled incorrectly, overestimating fluid intakes by 450ml. In general, the mistakes were due to the amounts being over- and under- estimated, wrong drinks were recorded, drinks being given but not recorded or the drinks not given but recorded. Fluid rich foods were not documented as a part of the fluid chart.

Drinks were not recorded timely. Sometimes residents' intakes were documented during the day, but in general, the fluid intake charts were completed for a whole day at the end of the shift. At one time, it was observed that the drink was written in advance. Entries for individual residents were usually completed by HCA who was allocated to a resident for a day. However, it happened frequently that this HCA did not attend to the resident at all meals, but there was no evidence of communication between the staff. The HCA was therefore not aware of the drinks that had been given and consumed during the day for resident but was still required to complete a fluid chart. On few occasions, fluid charts were written by the nurse who was not around to witness hydration care throughout the day. When drinks were recorded, they usually represented the amount given rather than consumed by the residents. Monitoring whether the residents consumed their fluids was not evident. The standard amount of fluid recorded in the charts was 200ml. This most likely overestimated the amount of fluids consumed since the glasses and teacups contained only 150ml.

Fluid records were not used to monitor residents either throughout the day or over time. Fluid charts stayed in the resident files for a week before being placed in care

plans. There was no system in place to review the records and identify the residents who did not consume adequate amounts. At times, fluid intake records were incomplete and showed only a small amount of fluid drunk for the day, but these small fluid intakes did not need trigger the need to provide the residents with more fluids.

Observing individual residents over the course of fifteen consecutive hours demonstrated that on many occasions a cold drink, which was present at the bedside from before 6am was not consumed or refilled throughout the day and was still present at the end of the day. This was evident for the residents who stayed in their rooms and those who spent their days in communal areas. Similar situation was observed for jugs of water and squash in the sitting and dining room; these were not changed or refilled, but often stayed full throughout the day. Unfortunately, the lack of monitoring prevented the staff to recognise this as a problem.

Work organisation and resources

The problem of inadequate hydration care arose from a wider culture in the home that prioritised other care activities, especially providing personal care. There was an allocation sheet, which included a section to assign staff to hydration-related tasks such as the mid-morning and afternoon ‘tea rounds’, ensuring appropriate fluid consistencies for the residents prescribed thickeners, but this part was frequently not completed. Allocations to the individual residents concerned washing, toileting and documentation, but nutrition and hydration was not included.

There was also a system in operation where HCAs were given badges and were responsible for overseeing the residents at different locations such as dining room or lounge. However, the HCAs were still responsible for providing personal care to the residents allocated to them, which meant that at times, they were required to be in two different locations at the same time. Lack of allocations to hydration tasks resulted in staff considering hydration as less important and the fragmented care made them unaware of how little drinks they provided to the residents. Additionally, due to diffusion of responsibility, it was difficult to make staff accountable for their actions. An extreme example of this issue was one occasion where the afternoon drink round was missed. This happened because a member of the kitchen staff brought a cake and offered it to the residents in the lounge; staff assumed that if

cake was given, the drink round was already done. After a while it was pointed out that the drinks were not distributed but since it was late in the afternoon, only the residents in a lounge were given drinks.

Staff focus on personal care was evident. Majority of the time was spent on washing the residents and changing incontinence pads. They went through the day trying to complete their tasks as quickly as possible. After dinner, most residents were taken to their rooms and put into beds. Whatever time was left at the end of the shift, HCAs felt they ‘earned’ it and used it for their private time. As observed a couple times at the end of the shift, the staff were paying little attention to the residents’ needs after they completed all their tasks.

It was observed that the availability of the equipment also impacted the staff ability to provide fluids. Shortage of beakers was observed to be a problem for the staff on the unit, who had to retrieve them from the residents and hand wash them in the kitchenette. Dirty crockery was sent to the kitchen for washing after the mealtimes and there was no system in place to ensure adequate supplies between meals. This routine, together with the low supplies of cups and beakers resulted in HCAs being reluctant to send any crockery to the kitchen and they took it upon themselves to wash most equipment by hand. This demanded a significant amount of time, which contributed to the delays in fluid provision. The crockery also held only 150ml of fluid, which would require at least ten drinks to be offered throughout the day to reach the recommended 1500ml. This would involve providing at least one and sometimes more drinks at each opportunity throughout the day.

Similar problems were observed with restocking drinks themselves. Early in the morning, a kitchen assistant restocked the kitchenette with the drinks and supplies such as juices or milk. However, these were not always restocked to the level that ensured the supplies lasted throughout the day. During the shift the HCAs were required to go to the distant kitchen and obtain these items themselves. Additional problems arose from the fact that HCAs did not check if other items were needed and made frequent trips to the kitchen throughout the shift. This resulted in a large amount of time wasted and sometimes delayed the drink provision to the residents. On one occasion it was also observed that the staff member was trying to offer an

alternative drink to the resident because the drink requested was not available on the unit.

It was also apparent that the staff were not always aware of the needs and preferences of the residents. This information was provided in care plans, which remained locked in the nurses' office and were not readily available to HCAs for reference. As a result, the staff verbally communicated all information about the residents and made many assumptions about the individuals' needs. Care plans themselves often included the requirements of the residents, but the preferences were not always available. Drinks that the residents received did not always match the needs and preferences written in care plans. This was most prevalent in vulnerable individuals, such as those who required assistance to drink. As an example, one resident who liked tea, was not observed to be given any throughout the entire period they were observed, while another resident had no information written regarding their preferences. Both residents were fully dependent on staff to receive care and they were within the group of those who consumed the least fluids.

Clinical staff were the main fluid providers. Data from observations on unit A showed that 70% (33/49) of the drinks were given by HCAs and further 13% (6/47) were provided by nurses. Observations confirmed the staff perceptions that some family members were helping while others did not. Where they did help, they naturally offered fluids to their own relative. For some residents, drinks served by the family provided most of the fluids consumed. Non-clinical staff such as housekeepers, managers and kitchen assistants were rarely involved in hydration care. The nurses and HCAs did not expect the other staff to contribute to provide any hydration and frequently said that these staff were not trained to provide fluids to the residents.

5.4 Process Map

The data captured in observations was used to create three process maps (Appendix 6).

- A general one describing the opportunities to obtain drinks at different points of the day for different locations
- A process of offering and providing a drink at mealtimes
- A process of offering and providing a drink between the meals

Two additional maps were created for mealtimes and between the meals to demonstrate the 'ideal' process for fluid provision. These two maps were intended to be used as a reference when AED was constructed, and interventions were designed.

Staff, residents and family were approached individually and were guided through the maps and were asked for their views. Only a few staff provided feedback, residents and relatives agreed that the maps represented the hydration care provided in the homes and had no comments. The staff also agreed and instead providing comment focused on reasons hydration care was not optimal. These included: lack of time, issues with some members of staff who were perceived less committed to providing the best care for the residents, long distance between the kitchenette and the residents' rooms, and problems with access to the resident care folders which prevented the immediate recording of the fluids. Staff felt that they did their best to provide fluids for the residents and they were not able to identify any barriers that prevented them to do so.

While construction of process maps did not bring any information except what was already known from the observations, they were useful in communicating the findings with the staff and the residents and provided a good reference to the problems when planning the interventions for the Action-Effect-Diagram.

5.5 Action-Effect Diagram

Data from observations identified several barriers, which contributed to inadequate hydration care and resulted in inadequate fluids consumed. These were categorised into five themes (Table 5.6) and provided the basis to designing strategies that could be tested to improve hydration of the residents during AED session.

The session took place as planned, and sixteen participants attended including care home and clinical services managers, deputy managers, one nurse from unit B, two HCAs from unit B, one AC, members of research team, a representative from local Clinical Commissioning Group and the team from CLAHRC. The AED session was important for a few reasons. It provided a team-building activity, which helped to motivate and engage staff. It also provided an opportunity to summarize the findings of the observations to all stakeholders and discuss their significance in relation to

fluid consumption of the residents. Finally, the session helped to identify potential strategies for improving hydration care and optimising fluid intakes. The diagram itself was useful for providing a visual aid for describing why the included strategies were chosen and how they potentially contributed to the overall aim of increasing fluid intakes of the residents.

Based on the results of observations and discussions during the session, the AED diagram was created (Figure 5.5). Four key contributory factors have been identified that likely influenced fluid intakes of the residents:

CF1: Understanding residents' needs, preferences and abilities;
CF2: Providing drinks that meet needs and abilities;
CF3: Increasing opportunities for fluid consumption;
CF4: Identifying and responding to unmet hydration needs

Contributory factors 1-2 focused on delivering person-centred care with a goal to provide drinks according to residents' needs and preferences. Since the observations identified that meeting the resident preferences was an important factor affecting the experience of drinking, it was hypothesised that ensuring all residents were given preferred drinks and appropriate assistance would result in increased fluid consumption. The specific strategies therefore needed to identify which drinks residents liked to drink and making them available in the homes, establishing and communicating the individual drink preferences of the residents, and finding the efficient ways for residents to communicate their drink preferences with the staff. Contributory factor 3 focused on ensuring sufficient opportunities to obtain drinks were offered throughout the day. This was thought to be important because it was identified that while residents usually had access to fluids at all times, these usually did not include the types of drinks the residents preferred. Additionally, since the observations identified that some types of the residents did not have enough opportunities for obtaining drinks, it was important to introduce the strategies which would ensure that all residents were given drinks at frequent intervals during the day. The interventions addressing contributory factors 1-3 were expected to ensure that all residents received preferable fluids in sufficient quantities, which would help the residents to consuming adequate amounts of fluids. In addition, contributory factor 4, which concerned monitoring of the residents at risk would ensure that more attention

was given to the residents who failed to consume their drinks and remained at risk of low fluid consumption. The identified strategies are included in the AED diagram. The rationale for using these specific interventions is provided in more detail in the following chapter. Few areas required further research before interventions were developed. These included: training, exploration of residents' drink preferences, and evaluating the drinking vessels.

Table 5.6: *Summary of barriers, which contributed to inadequate fluid consumption.*

Theme	**Issues**
Timing	Limited opportunities to obtain fluids
	Residents generally offered one drink at each opportunity
	Residents missing the opportunities if asleep or not present
	Residents missing the opportunities if requiring assistance
	Hot drinks not offered with or after the meals
	No mid-morning drink round
Location	Residents in communal areas get more drinks
	Residents in communal areas get a wider variety of drinks
Meeting resident preferences	Residents not asked about fluid preferences
	Limited type of drinks offered
	Short supplies of drinks available on the unit
	The quality of the drinks does not always meet resident preferences
	Drinks in the kitchenette not easily accessible and therefore not offered regularly
	Fluid rich foods: only available at mealtimes, favourite foods rarely available
	Fruit provided to the units but no equipment to cut it
Equipment	Limited availability of a drinking equipment, cups often hand washed by HCAs
	Cups and glasses available do not suit residents' needs and /or preferences
	Little thought is given into the type of cup most suitable for the resident
	Residents requiring some level of assistance not sufficiently supported
	Residents not correctly positioned for eating and drinking
System weaknesses	Inadequate communication between the staff
	Unreliable monitoring and documentation
	Staff perceive fluid intakes as adequate
	Other tasks given priority
	Gaps in staff knowledge about hydration
	Toileting issues
	Staff not allocated to tasks other than washing and dressing residents

5.6 Discussion of findings and implications for the next steps

Results of the observations confirmed that hydration in care homes was suboptimal. Residents' fluid intakes were low and only a small proportion consumed adequate amounts. While the individuals who needed assistance consumed the least of the fluids, all types of residents were at risk of chronic fluid deficit. The main reason for low fluid intakes was the insufficient amount of fluids served to the residents.

Previous chapter showed that the staff perceived hydration care they provided as adequate and attribute low fluid intakes to the residents refusing to drink. This study confirms the residents' perception that the hydration care they receive does not meet their needs and preferences. While fluids served to the residents were inadequate, residents experienced other barriers that prevented them from consuming adequate amounts such as not receiving the assistance they required and the drinks that did not meeting their preferences.

One of the reasons for low fluid intakes were the limited opportunities to obtain drinks. This study identified that the drinks were provided infrequently and that the residents were rarely able to get more than one drink at each opportunity. Considering the size of the vessels used in the home, the resident would require at least ten drinks to be able to meet the minimum fluid intake, which would mean that at some opportunities the residents would have to obtain more than one drink. Hence limited opportunities together with small volumes of the drinking vessels resulted in insufficient amounts of fluids served and therefore consumed by the residents.

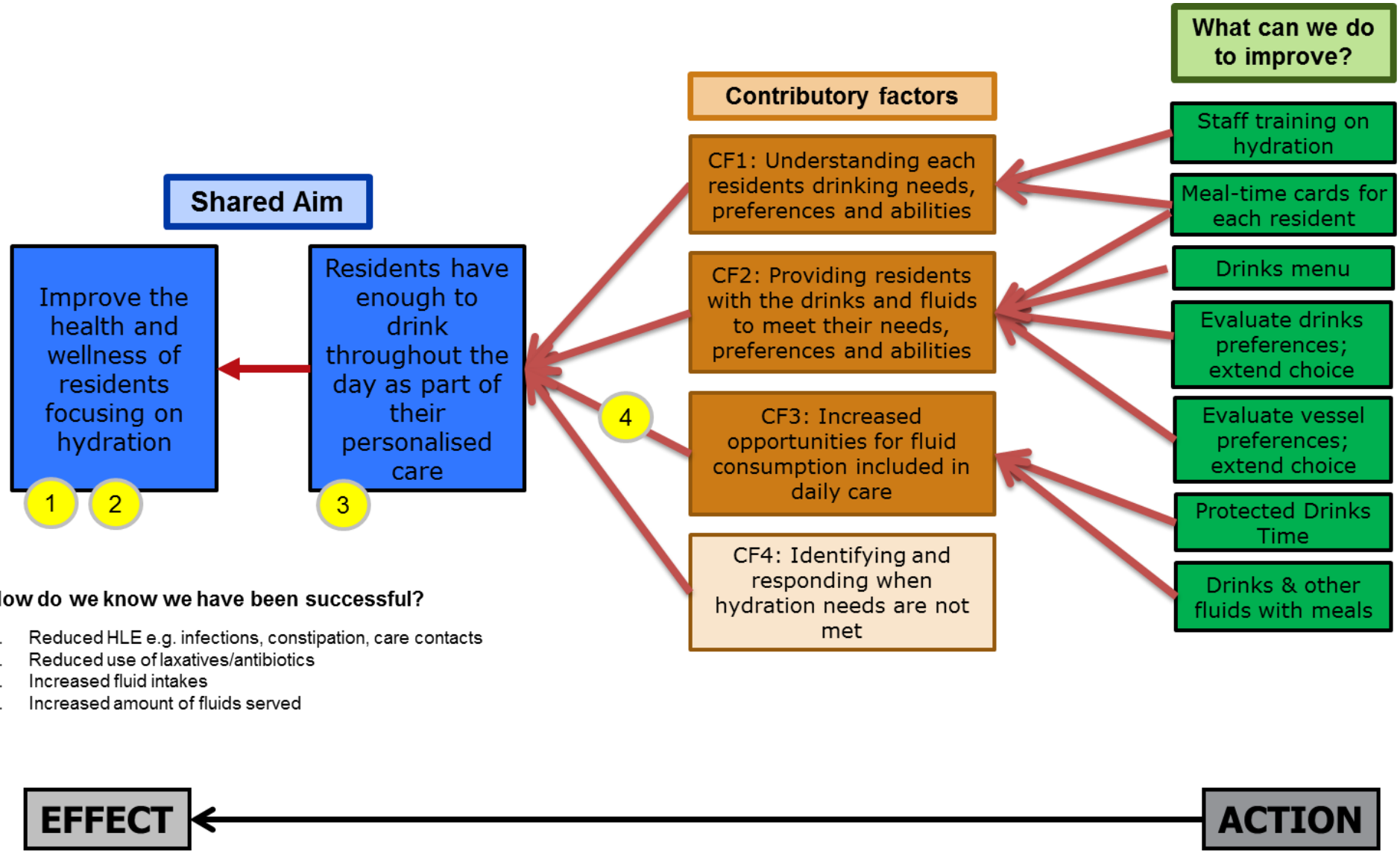

Figure 5.5 *Action-Effect-Diagram.*

Inadequate monitoring was an underlying reason for lack of opportunities to obtain fluids. Lack of allocations to hydration tasks or individual residents resulted in staff not being aware of how little fluids they served, and not being able to identify the residents who consistently failed to consume their drinks. Lack of clear understanding of which residents should have intakes recorded was another example of the limitations of monitoring policy. However, it can be argued that since all residents were found to be offered insufficient amounts, it would be more feasible to focus staff attention on providing enough opportunities to drink and ensuring that all residents are offered adequate amounts.

Lack of appropriate assistance prevented some residents from drinking the already inadequate amounts offered. This study identified a substantial proportion of the residents who either required full assistance to obtain drinks or needed frequent prompting and reminders to consume them independently. While identifying residents who need full assistance is easy, those who require prompting were more challenging to recognise. The results of this study demonstrated that this type of resident is prevalent, but the staff do not have skills and tools for identification of such residents. This was further complicated by the fact that residents' ability to drink independently slowly diminished with time and could change depending on residents' location and other factors. Finally, even the residents who were independent experienced barriers associated with inadequate assistance. This related to drinks not being accessible and the lack of toileting assistance, which prevented some to consume fluids. Inadequate assistance also concerned positioning of the residents, which potentially impacted their safety and the experience of drinking.

Preference compliance may be a simple, but effective way to encourage older people to drink, but this study demonstrated that preference was considered when providing fluids for the residents. This further restricted the amounts that residents consumed. Lack of importance of this issue was illustrated in care plans, which did not always include residents' preferences. Similarly, staff did not routinely ask the residents about what they wanted to drink and were observed to serve drinks that were most convenient for them to reach. The staff also made assumptions about fluid preferences and at times they thought appropriate to restrict consumption of certain drinks if they perceived them as less healthy.

Poor hydration care provided to the residents arose from system weaknesses that prioritised other aspects of care and did not effectively support HCAs to deliver their care efficiently. Weaknesses in monitoring combined with a lack of structured opportunities for providing fluids also resulted in some residents not being able to obtain enough drinks throughout the day. Time pressures of the staff and the focus on providing personal care resulted in some residents routinely missing on opportunities to obtain drinks. Unfortunately, these missed opportunities were consistently found in most vulnerable residents who needed assistance and stayed in their own rooms. One of the reasons for this happening is that the more vulnerable residents would be less able to ask for drinks and would rely on staff to take an initiative to provide these. Considering that those who need assistance would also require a staff member to devote time for this activity, staff could unknowingly avoid giving drinks to these residents in attempt to save time and move on to other tasks. It can be also deducted that for similar reasons the residents in their own rooms would receive less drinks as providing hydration in individual rooms would be more time consuming than providing it in the lounge. Similarly, one resident asking for a drink in a lounge could prompt the staff to provide the drinks for other residents. In addition to the insufficient fluids served, system weaknesses also resulted in resident barriers that prevented some from consuming the drinks they received. These regarded types of drinks not meeting residents' preferences, inappropriate vessels in which the fluids were served and inadequate assistance they received.

Some limitations were identified. One is the relatively small sample of the residents who were observed individually for fluid consumption. The small sample prevented the use of inferential statistics to compare the differences in fluids offered and consumed between different types of residents and the locations they were in. Another limitation is the generalizability of the results. Two units for frail older people in one large care home in London participated in this study. There is a possibility that these do not represent all care homes and that reasons for underhydration are different for residents with severe dementia. However, the observed lack of awareness among staff suggest that the problem may be universal.

This study confirms the residents' perception that hydration care does not meet their needs and preferences. Reasons for low amounts of fluid served were insufficient number of opportunities to serve drinks coupled with inadequate monitoring.

Additionally, residents experienced a range of barriers that further prevented them from consuming the already inadequate amounts served. This included not receiving sufficient assistance and not being provided with the fluids of their choice and the drink vessels not meeting their needs.

Chapter 6 Intervention phase

This chapter describes the intervention phase of this research. Findings from the previous phase (Chapter 5) demonstrated that the residents were not able to drink adequate amounts of fluids because hydration care they received did not meet their needs. A number of barriers were identified, and a set of interventions were developed. The interventions were tested for effectiveness and feasibility using PDSA cycles. The results are reported in this chapter, written in accordance with SQUIRE guidelines (Ogrinc et al, 2015).

6.1 Objectives

The purpose of this phase of study was to test the effectiveness and practicality of the developed strategies to optimise hydration care for the residents. The intention was to codesign these strategies with the residents and staff to ensure successful implementation of these interventions to sustain them over time.

6.2 Introduction

The interventions reported in this chapter were organised into three main themes: extending the opportunities to obtain fluids, providing preferable drinks and providing adequate drinking vessels. All improvement activities were tested using PDSA cycles for which planning template was designed (Appendix 7). Besides the improvement activities, AED identified the need for further preliminary work, which needed to be conducted before the planning of the interventions. The preliminary work required included establishing residents' fluid preferences and testing the drinking vessels. These activities were not tested using PDSA cycles but are also reported in this chapter. Brief description of the interventions reported in this chapter is provided in Table 6.1. All interventions were tested on unit B, there was a brief period when the interventions were disseminated to unit A as a bundle. These are described at the end of this chapter. Hydration posters were introduced across the units in a home to promote the improvement project (Appendix 8).

One contributory factor, concerned with monitoring and identifying the residents who did not consume adequate amounts, was not addressed in the interventions. This is because it was felt that monitoring was a complex issue that required an effort of a separate improvement project to address the problems.

Table 6.1 *Description of the interventions tested and reported in this thesis. * Preliminary work, not tested using PDSA cycles*

Intervention	**Purpose**	**Links to contributory factors**
Extending opportunities to obtain drinks		
Protected Drinks Time	Introduce a drinking opportunity for all residents	CF 2 and 3
Drinks before breakfast	Introduce additional drinking opportunity	CF 3
Testing drink preferences*	Determine fluid preferences of the residents	CF 1 and 2
Providing preferable drinks		
Drink Menu	Enable the residents to make choices about their fluid preferences	CF 1 and 2
Refreshment needs guides	To provide staff with an easily accessible tool for communicating needs and preferences	CF 1 and 2
Providing adequate drinking vessels		
Testing drinking equipment*	Determine preferences and needs of the drinking equipment	CF 1 and 2
Introducing drinking equipment	Assess the effect of introducing new equipment on fluid intakes	CF 2

Staff Training

This was necessary to address the gaps in knowledge and skills for the staff, so they could understand the importance of hydration and reflect on potential improvement strategies. Increasing staff knowledge about hydration was identified by care home staff involved in the project, who asked for training to be provided to everyone before the interventions started. Staff felt that they received basic training as a part of induction, but this was limited and was not focused on hydration specifically.

A two-hour training session was devised, which comprised of a number of different components, each with specific goals regarding the overall outcome. These included emotional mapping to help raise awareness of importance of drink preference; a quiz to alert staff to common signs of dehydration and reasons that older people became dehydrated; case studies to help staff identify and manage residents at risk of dehydration; and practical session to teach skills in managing residents with swallowing difficulties.

A total of 61 staff members across the home attended the training. Participants reported that they enjoyed the training and thought it was useful. Most staff thought their understanding of hydration care has increased following the training. Although it was not possible to objectively assess the effect of the training on the quality of hydration care the staff provided, it was assumed that training alone would not change the practice.

Care home staff experienced some barriers in attending the training sessions, which were related to how the working rota was arranged. For this reason, there were only few members of staff from unit A and B who attended and when they did, it was suspected that they had little influence to make a change throughout the unit. To further facilitate the training of staff, 'huddles' were devised and introduced. These huddles lasted about 15 minutes and provided short bursts of training to the entire team on the shift. Huddles were often used to support current PDSAs, for example discussing the importance of residents' individual preferences when the drinks menu was implemented. Supplementing the two-hour training session into shorter huddles carried out over one week was an efficient way of training a large number of staff on the whole unit team at the same time.

6.3 Extending opportunities to obtain fluids

6.3.1 Protected Drinks Time (PDT)

The problem

Observations showed the need to create more opportunities for the residents to receive fluids. Data from unit-wide observations demonstrated that some residents were not given fluids at all opportunities and that many residents only received the drinks at mealtimes. Refills or additional drinks were rarely offered. It was found that the residents who required full assistance were less likely to obtain drinks between mealtimes, and the residents who needed prompting would be given drinks but were not encouraged to consume them. Additionally, limited documentation and monitoring made it difficult for staff to identify the residents who consistently were not offered fluids.

Purpose

The purpose of this intervention was to give fluids to all residents and provide the time and assistance to those who required some level of support. It was hypothesised that if all residents got drinks and assistance they required, their fluid intakes would increase.

Prediction: the residents in the area where PDT was operated would be offered drinks, assistance to drink, and their fluid intake would increase.

Intervention

PDT was introduced in place of the “tea round” at 3pm. Staff were asked to refrain from tasks other than providing drinks, assisting the residents and offering refills. Four cycles were conducted over a course of ten weeks prior to PDT being implemented.

Measurement

The effectiveness of the intervention was assessed by recording the number, type and amount of drinks given and consumed by the residents. Feedback from staff and residents was also recorded. The first cycle was limited to the lounge only and was used primarily to test logistics, the last cycle was conducted without the presence of the researcher to ensure the staff were able to start PDT without the external cues. Data on drinks offered and consumed was therefore not collected for PDSA 1 and 4.

Description of PDSA cycles

Cycle 1: The plan was for an HCA to stay in lounge for approximately 30 minutes offering drinks and assistance. To create a more social atmosphere, the HCA was encouraged to make themselves a drink and converse with the residents.

This happened as planned. The HCA offered drinks and assisted those residents who needed it, although also used the time to complete her notes. It was agreed that the intervention has a potential to increase fluid intake, but the HCAs needed to focus entirely on assisting residents with drinks at this time.

Cycle 2: The plan was to extend PDT to all residents in the unit, with one HCA to stay in the lounge offering drinks and assistance and two HCAs in to load the trolley with the drinks and distributing them to the residents in their own rooms. Staff were asked to offer drinks to the independent residents first, so they could then focus on assisting residents. Staff were also asked to offer refills to the residents. To create a social atmosphere, staff were encouraged to make drinks for themselves and consume them while conversing with the residents.

The test started one hour earlier because a resident activity was scheduled for 3pm. Staff were not sufficiently briefed and did not have clearly defined roles. Most residents were offered drinks with some receiving refills, but because the trolley was not back from the kitchen, HCAs had to hand wash the cups and deliver drinks on trays. Because there was no trolley, staff could not offer a choice of drinks to the residents and majority were given tea. The residents with complex needs who required full assistance to drink were not offered drinks. The activity interfered with staff breaks and some HCAs for lunch before PDT finished. Feedback from staff and residents was positive, but some residents could not finish their drinks because it was too soon after lunch. Proportion of residents given drinks, number of drinks per resident and fluid intakes increased (Figure 6.1). It was agreed that for this intervention to be efficient, the trolley with the crockery needed to return from the kitchen and that staff needed to be allocated to their roles and breaks.

Cycle 3: The plan was for the nurse to allocate staff to breaks and PDT tasks, with one HCA allocated to lounge two to the residents' rooms. Nurse was also asked to allocate one HCA to collecting the trolley with the crockery from the kitchen.

This cycle did not start according to plan because staff were not allocated to their roles until prompted by the researcher. After the nurse allocated the staff to their roles, all tasks were carried as planned. Most residents were given drinks, some also got refills, although majority of residents were not given a choice. The staff mentioned that they were surprised that so many residents were willing to consume more than one drink. Proportion of residents receiving drinks was lower than in cycle 2, but still higher than at preliminary observations. Despite this, there were more drinks given per resident and fluid intakes were higher. Presence of the trolley and clear allocations helped the staff deliver drinks more efficiently. It was agreed that

the nurse needed to allocate staff to their roles in advance and without prompting from researcher. The plan for a design of new PDSA to ensure the residents were given drinks they liked was also discussed.

Cycle 4: The plan was for the nurse to allocate HCAs to breaks and roles for PDT in advance and for HCAs to start the activity without the prompt from the researcher.

Staff reported that PDT was carried out and everything went to plan. According to HCAs all residents were given drinks, but it was not possible to collect data on fluid intakes. This cycle showed that the PDT could be successful when initiated by staff, hence it was agreed that PDT should be implemented. It was also agreed that observations will be carried out a few weeks after implementation to ensure PDT is carried out as intended.

Post implementation

Data was collected approximately two weeks after the implementation of the PDT. This showed a reduction in both the percentage of residents who were given drinks (38.0%) and number of drinks provided (0.38 drinks per resident). The activity took approximately 30 minutes, which was insufficient time that all residents were given drinks and received the required assistance. Although staff were allocated to their roles and breaks, they did not adhere to them. The staff mentioned that they were short staffed and falling behind the schedule, which prevented them conducting PDT as intended.

Around this time there was a high turnover of staff on the unit. This resulted in many of the HCAs who had participated in the PDSAs cycles moving to other units and new staff joining the team who were not aware of the purpose and the conduct of PDT. In addition, a key team leader left the home, which meant that half of the shifts were covered by the temporary nurses who were not familiar with PDT. This resulted in staff not being encouraged to conduct the PDT or allocated to specific roles. Over the next two months the staff gradually reverted to the original system for “afternoon tea”.

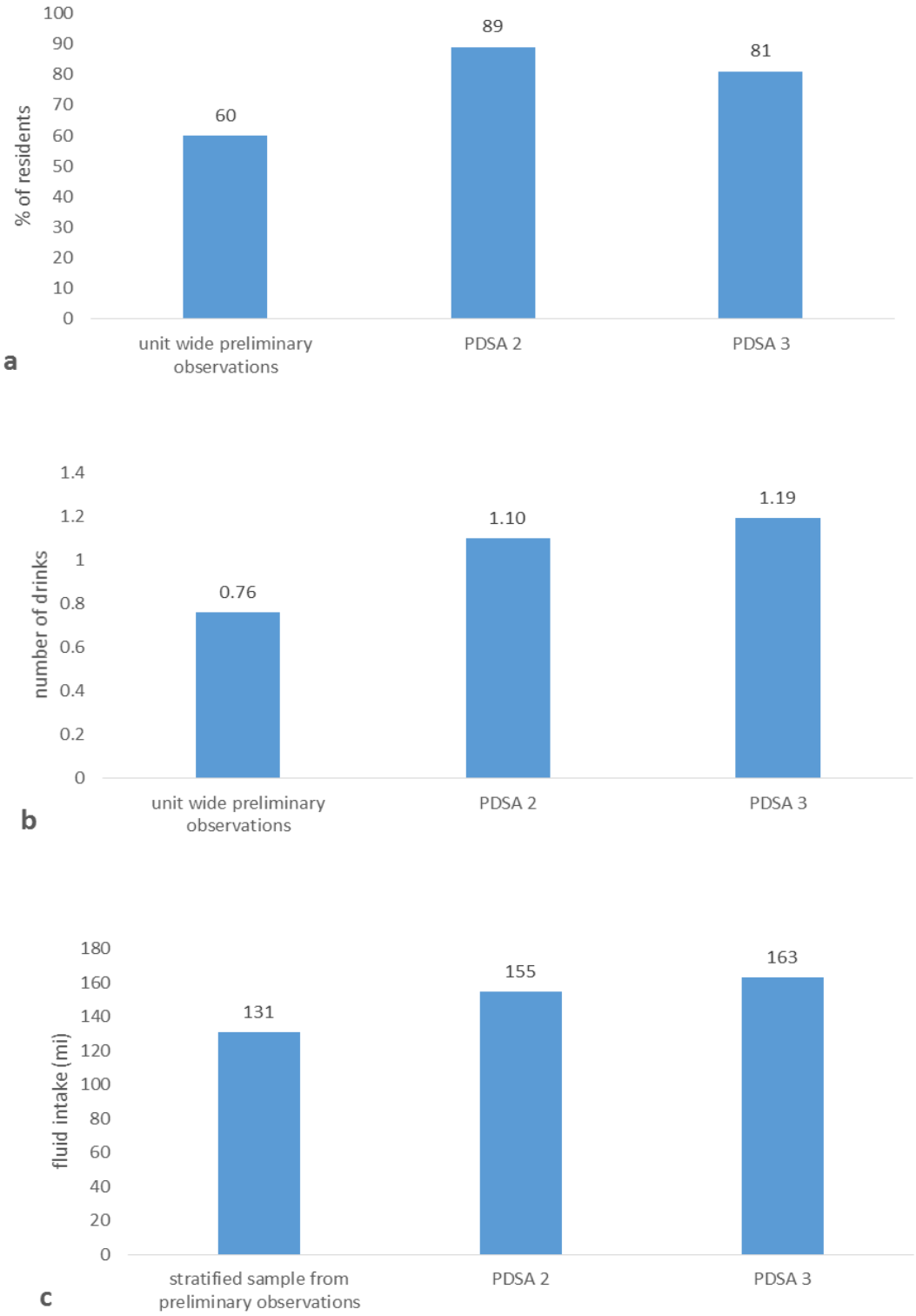

Figure 6.1: *Results of the PDSA cycles for Protected Drinks Time: a) percentage of residents given drinks, b) number of drinks per resident, c) mean fluid intakes/resident. Baseline data derived from preliminary unit-wide observations of the residents at all locations (a and b) and the preliminary observations of eight residents stratified into groups based on the level of assistance required and the location they usually stay during the day (c).*

Lessons Learnt

This intervention has a potential to be a successful in increasing fluid intakes for all types of the residents. Based on the typical day where four HCAs and one nurse were present, the final format is presented in Box 6.1.

Box 6.1: Final format of PDT

- *HCA1 assigned to the lounge*: make drinks for the residents and themselves, support residents who need prompting or full assistance, offer additional drinks as required.
- *HCA 2 and 3 assigned to own rooms*: distribute drinks to the residents in their own rooms using a trolley, assist those who need it, offer refills as required, deliver the drinks to the residents who can drink independently first.
- *HCA 4 on lunch break*
- *Registered nurse*: allocating to roles and breaks, reminding shortly before 3pm, monitoring PDT carried out as intended

While successful, this intervention relies on appropriate systems to make a sustainable change. Some barriers and facilitators were identified, which underpin the importance of general and context-specific logistics in supporting the PDT activity. However, there were several factors that were critical to the successful operation of PDT:

Leadership: The team leader was critical to ensuring that PDT occurred, was carried out as intended and was sustained when new staff arrived. They were essential in allocating staff to breaks and tasks, prompting staff to initiate the activity and monitoring its execution. The post-implementation period further illustrated how the loss of a key leader resulted in PDT activity gradually being degraded.

Allocations to breaks and tasks: for this activity to be efficient, it required at least three HCAs with clear allocations to break times and PDT tasks.

Timing: PDT needed to start around 3pm. If drinks were given too early after lunch, some residents were not be ready to receive them.

Availability of equipment: For the PDT to be efficient, the drinking equipment needed to be available on the unit at the start. Without the trolley, staff were not able to distribute drinks efficiently or provide a range of drinks, and if clean crockery was not available staff time was diverted from assisting the residents to washing the cups and beakers. The allocation of one HCA to collect the trolley from the kitchen helped to avoid this.

Allowing time for hydration: to ensure all residents received appropriate assistance, staff needed to focus only on PDT for about 45 minutes. As indicated by the post-implementation period, reducing the time allocated to PDT resulted in some residents not receiving drinks and assistance.

Limitations

While the PDT was shown to be effective in increasing fluid intakes of the residents and initial feedback from staff and residents was positive, it was difficult to sustain. Staff turnover and the loss of leadership were detrimental to the success of PDT. This highlights the importance of ensuring staff see the activity as an integrated part of providing care to the residents rather than a stand-alone task. It is also possible that the activity was implemented too soon, and that cycle 4 where staff initiated the activity without the prompt from the researcher should have lasted longer. However, due to the project time pressure, the decision was made to implement this activity. The pressure also came from the team that wanted to move on with the improvement activities. Furthermore, there is a possibility that staff did not provide the truthful feedback or in some way were not able to identify the barriers at the time of testing. If these were unresolved, they would negatively impact on sustainability of PDT.

6.3.2 Drinks before breakfast

The problem

After the introduction of the PDT, there were still too few opportunities for the residents to receive drinks and that another drink round was needed. Logistically, this would be difficult to achieve, because the staff were busy with other tasks

outside the mealtimes. It was clear that the new opportunity had to be linked to another activity that was carried out around this time.

Drinks before breakfast were introduced because this was the time when few residents were given drinks. It was also noticed that the residents were frequently brought into the dining room and were sat at the table for a long time before being given breakfast. Resident interviews also indicated that many would like a drink around this time.

Purpose

The purpose of this intervention was to create another structured opportunity to provide fluids. It was thought that providing additional drinks would encourage the residents to drink more and would positively impact the overall fluid intakes.

Prediction: residents present in dining room before breakfast would be given drinks and fluid intakes for this period would increase.

Intervention

The intention to introduce this intervention was discussed with the staff during the huddles. The staff were instructed to provide the drink to each resident they transferred to dining room at this time. Team leaders were asked to remind the HCAs and assist if necessary. The activity was tested in four cycles over four consecutive days.

Measurement

The effectiveness of the intervention was assessed by observing and recording the number, type and amount of drinks given and consumed. Observations were also conducted at breakfast to establish whether receiving drinks beforehand influenced consumption at this time. Feedback from staff and residents was also recorded.

Description of PDSA cycles

Cycle 1: The plan was for each HCA to offer a drink to each resident they transferred to the dining room around this time. The staff would ask the residents what they wanted to drink and provide the fluid of choice. Staff were asked to assist residents as needed.

This cycle was carried out as intended. All residents were given drinks, and fluid intakes increased (Figure 6.2), although the residents were predominantly given cold drinks. Resident fluid intakes at breakfast did not decrease. Staff noted that the activity had little impact on their workload and could be introduced as a daily routine. Feedback from residents was also positive as they welcomed a drink earlier than usual. It was agreed that the intervention was successful in increasing fluid intakes of the residents and that the same cycle would be repeated with another team of HCAs.

Cycle 2: The plan was for HCAs to offer drinks to the residents that they transferred to the dining room before breakfast. For this cycle, the huddle was scheduled for the time after breakfast and it was not possible to brief the staff about the activity beforehand. Nurse was responsible for briefing all HCAs at the start of the shift.

This cycle did not adhere fully to plan. The HCAs were not fully aware of the activity and only offered drinks shortly before breakfast. Number of residents and fluid consumed were comparable to the time before the intervention. Residents were given only cold drinks. It was agreed that this cycle would be repeated in a current form and that staff would also offer hot drinks to the residents.

Cycle 3: the plan was for staff to prepare flasks with tea and hot water before the activity started. Staff were asked to provide preferred drinks to the residents who were present in dining room before breakfast.

This cycle was carried out as planned. Nurse prepared the flasks with hot drinks and prompted the staff to start the activity. The proportion of residents given drinks increased and some residents were given more than one drink. Residents' average fluid intakes increased and there was no effect on fluid consumption at breakfast. More hot drinks were offered to the residents, although these were not offered to all who requested them. The nurse did not remind the staff to carry out the activity but was observed to give drinks to the residents. It was agreed that this intervention should be repeated in a current format and that the nurse would ensure hot drinks were readily available.

Cycle 4: staff were asked to offer drinks to the residents while they were transferring them to dining room. Nurse was asked to remind the staff and ensure flasks with hot drinks were pre-prepared before the activity started.

This happened as planned. Nurse prepared the flasks with hot drinks and staff did not require prompting. Hot drinks were provided to all residents who requested them. Fluid intakes for this period, and proportion of residents receiving fluids were higher than at baseline and comparable to cycle 1 and 3. Many residents received more than one drink and despite this fluid intakes at breakfast did not decrease. It was agreed that this intervention should be implemented in a current form.

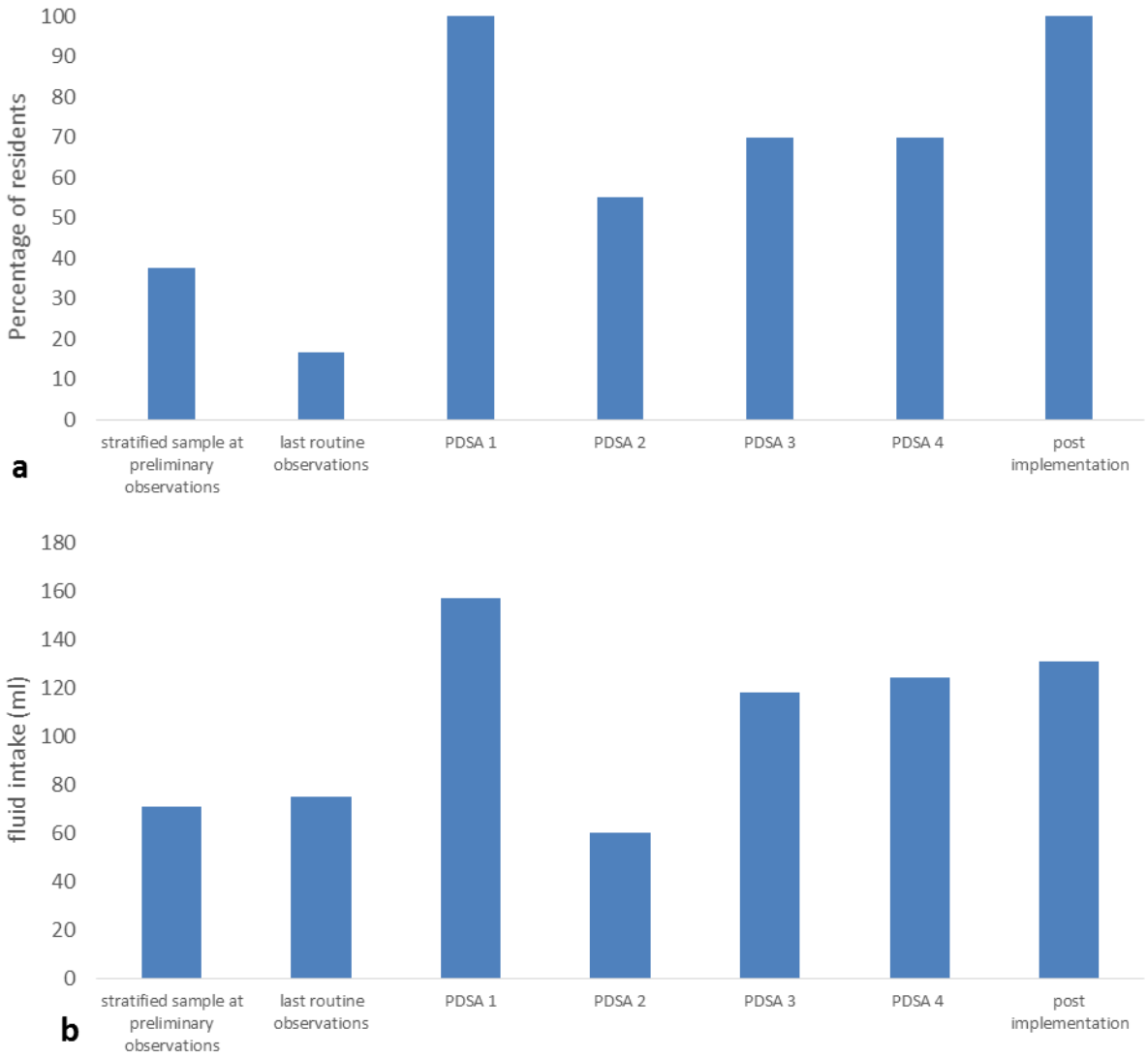

Figure 6.2: *Results of PDSA cycles for drinks before breakfast: a) proportion of residents receiving drinks, b) average fluid intakes.*

Post implementation

Data was collected approximately one week after the implementation of this intervention. The results showed that staff carried out the activities as intended,

without prompting from the nurse. Proportion of residents receiving drinks and fluids consumed were comparable to those during PDSA cycles.

Lessons Learnt

This intervention has a potential to increase fluid intakes for the residents present in dining room before breakfast. The final format of the intervention is provided in Box 6.2.

Box 6.2: Final format of Drinks before breakfast

- *All HCAs transferring the individual residents to dining room before breakfast*: ask the resident what they wanted to drink, provide drink of choice, offer assistance/prompting as necessary to ensure drinks are consumed
- *Nurse*: remind staff about the activity, prepare flasks with hot drinks or allocate one HCA to the task, monitor this intervention is carried out as intended

As with PDT, the success of this intervention relied on appropriate systems in place. Barriers and facilitators identified highlight the importance of adjusting the existing tasks to fit the new activity and planning ahead:

Preparing drinks beforehand: When given a choice, many residents selected a hot drink, but these were not offered in the first two cycles. It was noticed that during cycles 3 and 4, when the nurse prepared flasks with hot drinks, more hot drinks were served to the residents. The flasks also served as a reminder to staff to offer the drinks.

Reminding staff: As with previous activities, intervention initially required prompting from the nurse or researcher. Continuous monitoring and reminders resulted in drinks given without delays and more residents being offered a drink. In one cycle, when it was observed that the nurse did not prompt the staff but tried to provide the drinks herself, less residents received drinks. This was because it was difficult to monitor who has been given drinks. Appropriate mentoring of new staff members was also important to establish the routine as it was observed that when a new HCA

was asked to provide the drinks for a couple of residents, she repeated the same task without prompting the next day.

Linking to existing opportunity: This intervention was successful because it was linked to the activity that the staff were providing at this time. This ensured that the staff time was not compromised.

Limitations

This intervention was limited to the residents transferred to the dining room before breakfast. The residents who benefited most from this intervention were those who were independent. It was observed that the residents who needed prompting or assistance did not always receive the support they required. Ensuring all residents received appropriate assistance or extending this intervention to reach the residents in their own rooms would be difficult logistically as staff were busy washing the residents at this time.

6.4 Providing preferred drinks

6.4.1 Preliminary work: Testing drink preferences

Introduction

Results obtained from the resident interviews showed that residents were not always given the drinks they preferred. These findings were supported by the data from the observations, which showed that the residents were not asked about their preferences when the drinks were given. Most commonly offered drinks were tea, water and squash. It was also observed that water and squash were often not consumed and that the same drinks were on the residents' tables throughout the day. Other drinks were available on the unit, but they were not routinely offered to the residents. Resident interviews and observations also indicated that the existing range of fluids could be expanded, but little was known about the preferences. Little data about the preferences also exists in the literature. Few studies acknowledge that residents do not like drinking water and many suggest preference compliance increases fluid intakes, but none of these studies explored the preferences of older people.

The purpose of this work was to determine fluid preferences of the residents and expanding the existing range to better fit their likes. It was hoped that exploring these

preferences would enable care home to make better decisions about which drinks should be stocked and available on the units for the residents to choose from.

Methods

All residents expressed a strong desire to drink either coffee or tea and it seemed unnecessary to explore these preferences. If anything, many residents stated that these drinks were not offered often enough to them. There was a need to explore cold drinks that could be provided to the residents to supplement the hot drinks, so the residents had a source of fluid that they liked when the staff were busy with other tasks. Drink tasting was first conducted in the form of the structured sessions, carried out as part of the activities in the café. Two structured sessions were conducted, after which time the drink tasting was within the units A and B.

Ten drinks from the range were chosen for each test. These were purchased in local supermarket or obtained from the care home if already available. Each resident arriving at the café was asked if they would like to participate in the tasting session. If the residents agreed, they were presented with the 50ml of the tested drink as well as a 50ml of the control sample. Both samples were provided in the identical plastic, disposable cups. The control was a cold drink commonly provided in a home that most closely resembled the tested drink. The controls available were tap water, orange squash and blackcurrant squash at room temperature, and milk served cold. Both samples were given at the same time and the residents were free to choose which they wanted to try first. The residents were not told what drinks were tested. After the second session, the tasting was moved to the unit, where one drink a day was tested. It was hoped to receive at least twenty responses for each type of the drink.

The drink preference was measured on a five-point scale using a tool based on the methodology described by Pouyett *et al* (2015), which enables the communication with people with cognitive impairment (Figure 6.3). The tool prompted the first question, whether the resident liked a drink. Upon receiving the response, the second question enquired how much they liked (or disliked) the drink. If the resident seemed undecided, the answer marked “neither” was written and the follow up question was not necessary. All positive answers were counted and presented as a percentage of the responses given.

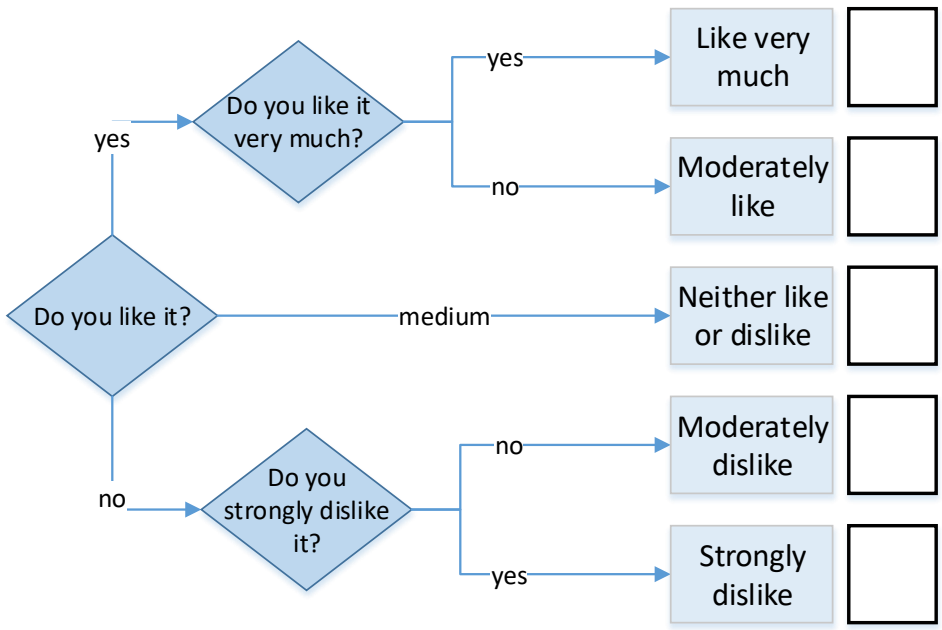

***Figure 6.3**: Communication tool that facilitated data collection on fluid preferences.*

Results

Twenty-four test drinks and four control drinks were included in tasting sessions. A total of 483 pairs of drinks were tested in 47 residents. The results showed that the residents preferred the fruit juices to the widely available squash (Figure 6.4). Data demonstrated a preference to strong flavoured, sweet, less acidic drinks such as apple, mango and pineapple juice. Most of the preferred drinks were already available in a care homes, but not commonly offered. Individual preferences seemed to be influenced by cultural customs or the flavours that the person was familiar with in the past. For example, one resident liked mango juice because it reminded her of the childhood in Pakistan, while a British-born resident mentioned he liked apple juice because it was '*a safe choice*'. Two drinks, which scored highly, but were not routinely available in the home were chocolate and strawberry milk, although the kitchen supplied syrups to make them. The drinks most commonly served to the residents scored relatively low. The flavoured milks were made available to the residents on the units because of the results of the observations, but there was no need to expand the drink range any further. The staff were made aware that fruit juices were preferable with the residents and were asked to promote them to encourage the residents to drink.

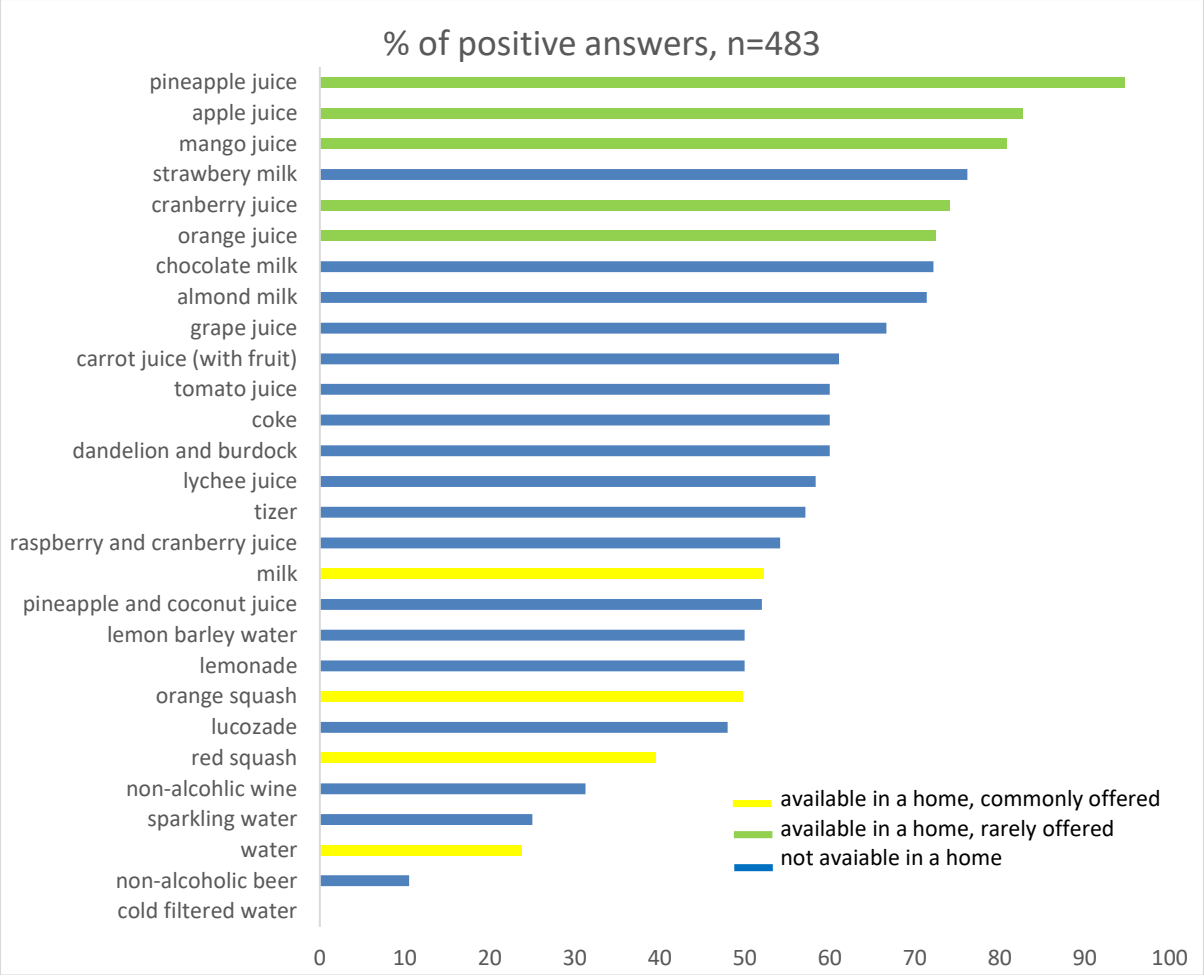

Figure 6.4: *Results of testing the preferences of different types of fluids.*

Key findings

The residents tended to like the drinks that were full of flavour, sweet and not very acidic. Individual preferences were influenced by cultural customs or the flavours that the person was familiar with in the past. Many of these preferred drinks were routinely available in the care home, but not fully utilised. The drinks commonly served to the residents were not well accepted and therefore were likely to limit rather than encourage fluid consumption. A wide variety of drinks needs to be available and systems must be established to enable the residents to make an active choice of drinks they would like to receive.

6.4.2 Drink menu

The problem

Drinks provided to the residents did not always meet their preferences. Results of drink tasting showed that water and squash, commonly provided to the residents,

were not well accepted. In the preliminary interviews, some residents mentioned that the drinks they liked were not always available and it was also evident that some were also not aware of the full range of drinks the care home provided. Observations in preparatory phase showed that residents were not always asked about the drinks they would like to consume, and when this happened it usually involved the HCA offering of a cup of tea. When queried, staff indicated that communication with some residents was difficult and that many residents were not able to make a choice for themselves. It was evident that there was a need for a tool that would support the residents making fluid choices.

Purpose

The purpose of this intervention was to increase the range of fluids given to the residents by providing them with a pictorial list of the drinks available in a home. It was hypothesised that providing the preferred drinks to the residents would encourage their consumption and subsequently lead to higher fluid intakes.

Prediction*:* a wider selection of drinks will be given, and resident fluid intakes will increase.

Intervention

To begin with, a one-sided A4 menu was created with both, hot and cold drinks listed. Next to each drink name was an image related to that drink e.g. a fruit or a drink's logo. Following feedback from staff and residents, the menu was redesigned with cold drinks on one side and hot drinks on the other (Appendix 9). This incorporated larger images, allowing residents to point at the drink they liked. The menus were distributed across the unit. Copies were placed in the dining room, lounge and in residents' bedrooms. Additional menus were provided so staff could take them to the residents individually as needed. It was thought that PDT presented a good opportunity to introduce the Drink Menu because fluids were given routinely around this time.

Measurement

The effectiveness of the Drinks Menu was assessed by observing and recording the number, type and amount of drinks given and consumed. This was collected for PDSA 1-3. One set of data was collected a week before the menus were introduced

to provide a ‘baseline’ measure. In PDSA 4, observations were carried out by the researcher to assess whether the menus were used. Feedback from staff was recorded in all cycles.

Description of PDSA cycles

Cycle 1: The plan was for HCAs to load the trolley with all drinks on a menu, take copies of the menu to the residents and encourage them to have both, a cold and a hot drink. Kitchen assistants were asked to supply enough drinks for the activity.

This did not happen according to plan. Staff were not briefed, and the menus were not utilised from the beginning. When menus were in use, residents were offered one drink rather than two. Juice supplies were low, and some types were not available by the time this activity started. Some drinks were available, but were not on a trolley, resulting in staff having to go back to the kitchen when these were requested. The staff were not allocated to PDT tasks; hence some residents were not given appropriate assistance. The drink menu did not increase the number of drinks given and number of types of drinks offered (Figure 6.5). Because the test was not carried out as intended, the data on fluid intakes was not collected. It was agreed that since the test was not carried out as intended, it was not possible to determine its effectiveness and that the test would be repeated in the same format, ensuring that staff are prepared for the activity and sufficient drink supplies are provided.

Cycle 2: The plan was to carry out PDT as intended and use the drink menu. Staff were asked to load the trolley with all drinks and encourage the residents to have a cold and a hot drink. Kitchen assistants were asked to ensure enough drinks were present and team leader was to remind staff about the activity.

In this cycle, there were only few staff to start PDT. Drink menus were utilised from the beginning, but not all residents were offered a choice. Not all drinks were available on a trolley and staff had to go make them individually. Some juices were not provided in sufficient amounts and HCAs had to get them themselves. Staff reported that it was difficult to communicate with some residents using the drinks menu. The number of types of drinks given to the residents increased, but number of drinks and fluid intakes remained the same. It was decided that it was not possible to assess the effect of this intervention because of the problems with conducting PDT.

Hence it was agreed that the next test should be carried out in the same format, but that nurse would allocate HCAs to their roles and breaks and monitor that these were adhered to. Since the menus were not offered to all residents, it was decided that the importance of providing preferable drinks would be addressed in huddles. Additionally, it was agreed that the deputy manager would discuss the concern regarding drink availability with the catering manager.

Cycle 3: It was planned that HCAs would carry out PDT according to allocations and would use the Drinks Menus to offer two drinks to the residents. Nurse was responsible for allocations and monitoring the activity. Catering manager was asked to ensure that kitchen assistant would provide sufficient supply of drinks.

In this cycle, the PDT was carried out with only one HCA present. The HCA offered drinks using the menu to all residents in the rooms, which she was able to serve by herself. The HCA encountered problems when serving the drinks to the residents in the garden. The HCA offered drinks to residents from the unit, but other residents also wanted drinks. The HCA was trying to serve drinks to all but was too busy with the demands. Staff from other units, who were present in the garden for activities, started serving drinks, but used all crockery resulting in the HCA not being able to serve drinks. Some HCAs joined in at the end of the activity, but it was too late as most residents were finished by then. Staff reported that some residents had difficulties reading the menu. The selection of the drinks was better than at baseline and similar to PDSA 1 and 2, but this did not result in more residents receiving drinks or fluid intakes increasing. The results were discussed, and it was agreed that PDT was not carried out as intended, which hindered fluid consumption of the residents. It was agreed that the next cycle should be repeated in this format, ensuring that staff are allocated to tasks and breaks. It was also agreed that the menu would be redesigned to include large pictures for the ease of reading for the residents. *Note: after this cycle, the activity halted for a few months, during which time, the issue of cost was negotiated with the catering and care home managers. Care home manager was keen to keep the menus in dining room, lounge and resident rooms, but without HCAs actively using them.*

Cycle 4: The plan was for the revised Drinks Menu to be introduced on the unit and used for a period of approximately two weeks, after which the feedback from staff

would be sought. All HCAs were asked to use the menu each time they offered drinks to the residents, an activity coordinator was also asked to try the menu in a café. Nurse was asked to model the HCA behaviour by showing them how to use the menu and prompting them to do the same.

This cycle was carried out as planned. All HCAs reported that they were using drinks menus, although the observations of the unit carried out around this time revealed that they did not use them. The nurse was found not to use the menu and did not encourage staff to use it. Many staff reported the menus to be time consuming and some also indicated that the residents were not able to understand them. Feedback from one AC was positive, with no problems using the menu or communicating with residents reported. The AC commented that she was surprised about some residents' fluid choices. Although no resident feedback was obtained, it was observed that the residents were reading the menu in the dining room, and one resident who could not remember the drink she liked, was able to recognise it on the menu and read it out or point at it. While staff were reluctant to use the menu, it was observed that they were verbally asking the residents about their fluid choices. It was agreed that although staff were not utilising the menus as intended, this intervention was at least partially successful because residents were offered a choice, hence it was decided that the nurse and the deputy managers would continue reinforcing the use of the drink menus.

Post implementation

Observations showed no change after the introduction of the drink menu. Fluid intakes remained unchanged following the initial testing, but this was also because residents were not given enough support during the PDT. There also seemed be no increase in fluid intakes following the revision and reintroduction of the drink menu. This was most likely due to the activity not being fully implemented and the menu not being used as intended. While the menu was not fully utilised, but it was noticed that the HCA were still providing more fruit juices and were asking the residents about the preferences. The printed menus were not allocated the storage space and many copies were quickly lost and were not available when needed.

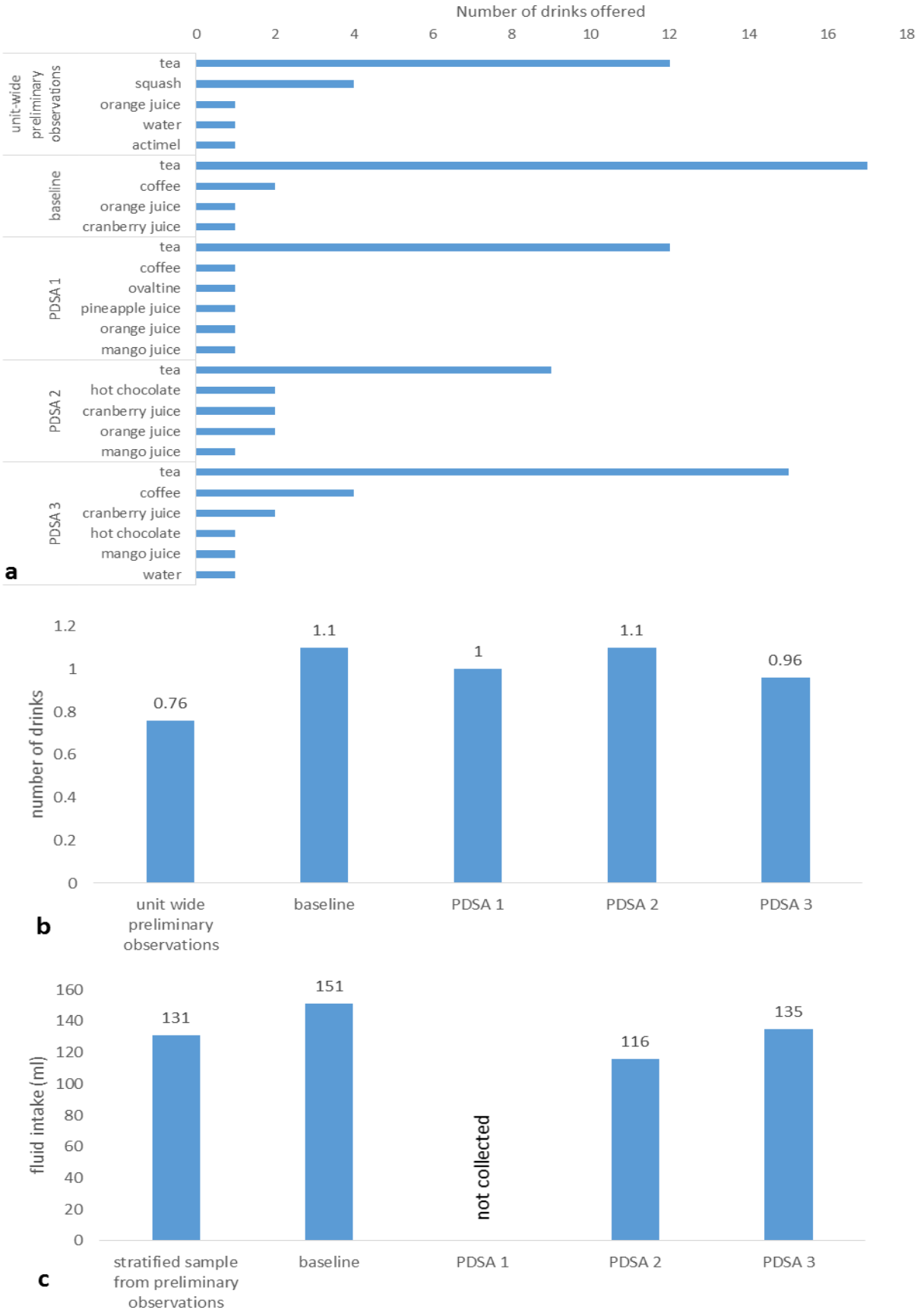

Figure 6.5: *Results of PDSA cycles for Drinks Menu: a) types and frequency of drinks given, b) number of drinks served per resident, c) resident fluid intakes*

Lessons learnt

The data from PDSA cycles showed that when presented with the opportunity, residents made choices different than those assumed by the staff. Hence if given enough drinking opportunities and assistance residents may increase their fluid intakes. Final format of using Drinks Menu is presented in Box 6.3. A few barriers to the successful implementation of drink menu were identified. Many resonated with the barriers encountered during the PDT.

Box 6.3: Final format of Drinks Menu

- *All HCAs:* use Drinks Menu when offering drinks to the residents
- *All HCAs:* ensure the copies of the menus, drinks, and drinking equipment are and readily available at structured drinks opportunities (e.g. PDT, mealtimes, drinks before breakfast)
- *Nurse*: model the use of Drinks Menu and encourage staff to utilise it at each drinking opportunity
- *Kitchen assistants*: ensure all drinks and supplies are available throughout the day

Leadership and allocations: As with the PDT, the team leaders' role was essential to ensure that the drink menus were utilised. Initially, the staff were not informed how and when the menus were intended to be used. The team leaders were not observed to use the menus themselves or prompt the HCAs to use them, which resulted in staff presuming that they were not required to do so. Staff allocations to PDT and breaks were not always monitored, which resulted in some drinks being offered but not consumed as the residents were not given enough support.

Drink availability: On some occasions there was either no stock, or not enough, of every type of fruit juice on the menu which HCAs were expected to load onto the drink trolleys. The drinks were restocked by the kitchen staff, but frequently to insufficient levels. Sometimes it was noticed that the drink was not available, but the

staff did not get it from the kitchen; instead they tried to encourage the resident to try a different drink. Staff sometimes went to collect the drinks from the kitchen, but it was time consuming. It was also observed that they were reluctant to request stocks from the kitchen. This seemed to be related to the various power structures within the home. As a result, when some drinks were not available, the HCAs felt uncomfortable taking the menu to the residents.

Costs: The drinks availability was discussed with the catering manager on numerous occasions. The manager has mentioned a number of barriers to why the juices could not be provided, but it was discovered later that the most important barrier was the cost. There was some concern that the staff would be drinking the supplies made available, but also it was noted that the cost of juices for the residents would exceed the budget allocated to catering. On few occasions, the catering manager approached the staff and the management to complain about the amount of juice used on the unit. Despite raising concerns about the costs, care home did not have a mechanism to capture how much of the juice was supplied to the unit, hence the estimated cost could not be calculated. Observations estimated the consumption of the juice at about 400ml/day per resident. HCAs were often observed not to use the drinks menu but giving the residents the juices without asking. This increased the tension due to some juice being wasted. The management were therefore reluctant to support this activity as it was felt that while the costs increased, there was little benefit for the residents in terms of fluid consumption.

Lack of time: The time constraints were often mentioned by the staff as the barrier to utilise the drink menu. They viewed PDT as a lengthy task and felt that adding a drink menu made it even more time consuming. The staff also assumed they knew their residents well and did not need to spend additional time asking them what they wanted to drink.

Communication skills: When observing the menus being used, staff seemed to be uncomfortable when communicating with the residents. Different cognitive and physical disabilities of the residents often combined with poor language skills of the staff resulted in little verbal interaction. They would ask other members of staff but were less likely to ask the residents directly about their fluid preferences. When

asked about the menu, the staff would respond that many residents were not able to make a choice, although this was not reported by Activity Coordinator.

Limited knowledge: It was noticed that on some occasions, staff were not aware of resident requirements. One concern was the sugar content of some of the juices, especially for the residents with diabetes. While the staff paid little attention to the sugar content of the cakes and other foods, they thought that providing juices would be detrimental to the residents' health. Some of the adverse effects of sugar mentioned by staff included raised sugar levels for diabetics and an increased risk of UTI. They were also observed to encourage the residents to make "healthier" choices by offering them the juices perceived to be lower in sugar content such as cranberry juice or tea instead of coffee.

Limitations

While the drink menu was not utilised as intended, residents were asked about fluid choices more frequently, therefore it was felt that the aim was at least partly met. It is expected that the Drinks Menu has a potential to increase residents fluid intakes, but the effectiveness of this intervention was not established in the PDSA cycles because of the problems associated with the running of PDT and the limited supplies of drinks available.

Drink menu was introduced to facilitate the communication between the staff and the residents, but staff found this method of communication uncomfortable and time consuming. This shows that the menu must be used together with appropriate support from the senior staff who should act as role models and prompt staff to use it routinely.

Additionally, offering preferable drinks, but not providing enough drinking opportunities or assistance, will not result in the increase of fluid intakes. The menu is therefore most efficient if used with the structured activities such as mealtimes or PDT when the staff focus on food and fluid provision and are more likely to offer drinks and support.

6.4.3 Refreshment needs guides

The problem

Preliminary observational work identified inconsistencies in the communication of the hydration needs and preferences of individual residents. Details on residents' needs and preferences were written in care plans stored in the nurse's office, but these were not accessible and there were no systems to capture any new information on the residents in an efficient way. As a result, HCAs relied on verbal communication to pass the information between each other, but this meant that assumptions were sometimes made about residents' needs and preferences. Thus, the residents were not always provided with the hydration care they needed or preferred. It was thought that providing staff with accessible information would result in residents receiving the care they needed, which would help increase their fluid intakes.

Purpose

The purpose of this intervention was to develop a simple communication tool that would enable the staff to easily access information on individual residents' hydration needs and preferences and therefore facilitate a more consistent hydration care.

Prediction: ensuring that the needs and preferences are met will result in increase of fluids consumed.

Intervention

The guides were modelled based on 'This is me' tool (Alzheimer's Society, 2010), and were adapted to mainly focus on hydration. They were developed based on observed practice and feedback from staff, relatives and the residents. The guides included food and fluid preferences, a photo of the resident and information on appropriate drinking vessels. The guides were colour coded, matching the level of assistance required.

Measurement

The first PDSA was used primarily to test logistics and was obtained in a form of feedback from one staff member. PDSA 2 and 3 sought feedback from staff and the data on number of completed guides. Upon introduction of the guides, staff were observed to determine the frequency of use of the guides and feedback was obtained from the staff, residents and family.

Description of PDSA cycles

Cycle 1: The plan was for one HCA to complete a template of the guide provided for one resident on the unit, type and print it out with an accompanying resident photo.

This cycle was not conducted as planned. The HCA completed the handwritten copy of the guide but was not able to obtain a printed copy and the photo. The HCA also raised concerns regarding an ability of some staff to complete these. It was agreed that obtaining the handwritten copy was easy, and that the HCA would continue completing them in the next cycle. It was thought that obtaining printed guides was important to the overall success and sustainability of the intervention as more than one copy could be made available to the staff and that these could be easily updated. Therefore, it was agreed that the logistics of the guides being printed would be explored while the handwritten copies are completed.

Cycle 2: It was planned that the HCA would be given a month to complete handwritten guides for as many residents as possible.

This did not happen as planned. The HCA did not complete any guides in the time given and referred to lack of time as a reason. Therefore, it was decided that completing the guides should be the team activity with each HCA being responsible for completing guides for three residents.

Cycle 3: The plan was to complete all guides in one week. Each HCA was allocated three residents and asked to complete handwritten copies. The nurse and the HCA who participated in cycles 1 and 2 were asked to provide support in completing them. The researcher was to discuss with the care home administrator the possibility to obtain printed copies.

This was not carried out as planned. At the end of the week, two HCAs completed the guides for six residents. Staff reported these were easy to complete, but that they did not have time to do so. The discussions with the administrator revealed that due to their workload they could not contribute towards producing these guides. The feasibility to create the Refreshment Needs Guides in a printed or handwritten form was discussed among the team and it was decided that these required further exploration, which was felt would take considerable amount of time and effort.

However, considering that it was unknown how these would affect the practice, it was decided that one HCA would be given time to complete these for all residents for distribution across the unit. Based on the results obtained, it would then be decided whether finding systems for completing and updating the guides was worth pursuing.

Cycle 4: The plan was for one HCA to complete the guides and for the researcher to prepare them in a printed format. Completed guides were to be introduced across the unit (Appendix 10) with three copies for each resident distributed across the unit: in the individual rooms displayed on the walls, in kitchenette for a folder to be taken with the drinks trolley, and in dining room and lounge used as placemats for the residents at mealtimes. Staff were asked to refer to them as needed for a period of one week.

This happened as planned. Upon introduction of the guides, staff were positive about them, but it was noticed that they were not used. When staff were asked why they did not consult the guides, they said that they knew their residents, therefore had no use for the guides. They mentioned that the new or agency staff would benefit from them. One new HCA was observed using the guides, but others still asked the established staff for information. In addition, one HCA raised concerns regarding sustainability of this intervention. In general, the residents acknowledged the guides but did not have any opinions on whether they liked them or not. The family liked the idea as they thought that the guides would help their loved ones eat and drink better. It was agreed that since staff found little use for the guides it was not feasible to continue with the development of these guides.

Post-PDSA

Considering the difficulties in generating and sustaining the refreshment needs guides, it was not feasible to develop this intervention any further. It was recognised that inconsistent care could potentially have negative consequences for the residents, therefore alternative methods of communication between staff were discussed following the decision to stop this activity. This coincided with the care home announcing the intention to introduce an electronic care planning software. As a result, the decision was made to abandon this activity as it was thought that access to care plans via an electronic system would provide an alternative to the guides.

Lessons learnt

The success of this intervention was hindered by several barriers associated with both creating and using the guides.

Creation of the guides: The initial refreshment needs guide was prepared relatively quickly, but the staff reported difficulty completing them due to perceived lack of time. This was because the completion of the guides was not viewed as a part of the job, with other tasks being a priority. Considering the reported time pressures of the staff, it is not feasible to expect the guides to be completed during the shift, hence it is necessary to allocate time specifically for this activity. This would be difficult to negotiate since it would entail additional cost to the care home.

Involvement of administrative staff: Clinical staff had no routine access to computers and were only able to complete the templates by hand. The electronic copies were considered more appropriate because they looked more attractive and were easier to update. Involving the administrative staff who had computer access was unsuccessful as they were reluctant to take on additional responsibilities. Leadership and authority of the management to influence the administrative staff is necessary to overcome this barrier.

Staff skills and abilities: there were concerns that completing the guides may be difficult, especially for those with poor language skills. Interestingly, no staff reported any difficulties except the lack of time. It is possible that some staff members felt uncomfortable reporting difficulty completing them in fear of being belittled. Additional training could possibly help addressing this issue.

Staff making assumptions: On few occasions, it was noticed that the information included in the guides was either incomplete or incorrect. This became especially evident when the families provided feedback upon which a large proportion of the guides had to be updated. It is possible that the staff did not refer to care plans and did not consult with the residents or their families when completing the guides. This could be the result of staff making assumptions that they knew everything about the residents; an explanation that is supported by the staff feedback on the use of the guides and use of drink menus.

Communication means: Verbal communication is preferred for sharing the information between the staff. This was observed with the new staff who were more likely to ask another HCA for advice rather than consult the Refreshment Needs Guides easily accessible to them. The potential risk of verbal communication is that the information could be forgotten or misinterpreted upon which wrong assumptions could be made. This did not only influence preference compliance but at times could also result in unsafe practices.

Limitations

Refreshment needs guides intended to provide a communication tool to facilitate the dissemination of information on fluid requirements between the staff. However, the preferred method of communication for staff was a verbal form. Both, the established and the new staff seemed to find no benefit from using the guides and the feasibility of creating these guides remains unexplored. This is an example of an unsuccessful PDSA, which was abandoned due to unproven effectiveness and challenging barriers to sustainability. There is a possibility that this intervention may be feasible to sustain, providing that care homes are willing to invest in the development of this activity. However, considering that care homes are likely to move towards the electronic systems, this intervention will probably have little value in the future.

6.5 Providing adequate drinking vessels

6.5.1 Testing drinking equipment

Introduction

The initial feedback from the residents and family highlighted the importance of the adequate drinking equipment. It was evident that the type of vessel offered was an important aspect of drinking for the residents because it influenced their ability and enjoyment to drink. The residents identified problems with the existing equipment. Firstly, many residents mentioned that they found the cups difficult to hold. Cups were heavy and had a small handle. This meant the entire weight of the cup was balanced on one finger, and this prevented the frail residents to drink independently. Glasses were heavy and felt ‘slippery’ to the residents who thought they could not get a good grip when lifting them. For the residents who could not manage the standard equipment, beakers were provided. This raised the issue of dignity for some residents. Few residents mentioned that they wanted to preserve their ability to

drink from standard equipment, so they did not look different from other residents. Some also mentioned that plastic affected the taste of the hot drinks. It was also observed that the residents who required full assistance were given drinks in beakers with spouted lids, regardless of their swallowing ability or preference. Another problem with the drinking equipment was that it provided only 150ml of fluids but, it was observed that some residents drunk their tea or coffee and the refills were not always available. For this reason, some residents resorted to drinking from the beakers, which provided a slightly higher volume. Thirdly, residents mentioned that the drinking equipment was not visually attractive. Residents also thought that beakers looked like a '*baby cup*' and made them feel self-conscious when they were in the company of other residents. The home encouraged the drinking equipment to be brought for the residents from external sources. As a result, some residents had their own mugs or glasses in the kitchenette. These were rarely used, except for some specialist vessels, such as the beakers for swallowing difficulties. The search of existing literature did not identify studies that looked at the importance of adequate drinking equipment, although one study mentioned the potential for using assistive devices (Godfrey *et al*, 2012), while another reported that the use of visually appealing drinking vessels attracted the residents to consume more fluids (Robinson and Rosher, 2002). Neither of these studies looked at improving the ordinary drinking equipment to enhance functionality and encourage independence in drinking.

The purpose of this work was to test different types of cups, glasses and assistive drinking devices to aid independent drinking for the residents.

Methods

The original list of assistive cups was produced by surveying three mobility aid websites. The list was created and presented to staff who were asked to choose the ones they thought would be the most suitable for the residents. The researcher and the lay representative have identified a few additional items. The cups chosen for testing represented a range of beakers, double handed cups and mugs and devices that helped to overcome specific problems for the residents (e.g. swallowing difficulty or difficulty tipping the head backwards). The ordinary mugs were purchased from the local stores using the criteria obtained from initial resident feedback, which indicated that the mugs had to be relatively light and have a larger handle. Cups and

mugs provided in a care home were also included in testing. These included the equipment routinely provided for serving drinks on the unit as well as additional items that were either purchased for the other units by the catering manager or were provided by the family to fit the specific needs of the residents.

To obtain the most reliable results from the appropriate resident groups, the cups were matched based on their potential suitability to the residents' needs, e.g. those residents who did not have much difficulty drinking from the standard equipment were offered the range of cups and mugs, while those with physical impairment were offered a range of beakers and other assistive devices. The cups were introduced to the residents at different points during the day. The resident was asked about the fluid preference suitable to the type of cup offered. The drink was presented in the test cup as well as the standard cup available in a home. It was planned to obtain the feedback from ten residents for each cup. The approach of cup testing was influenced by the experience of drink tasting sessions.

After allowing the resident to have a drink from both vessels (about 15 min), the residents were asked to rate both. To aid data collection for those with cognitive impairment, the questions were asked using the tool inspired by the framework described by Pouyet *et al*, (2015) and previously adapted for drink tasting. Based on the initial feedback from the residents it was decided that the vessels needed to be assessed on four features, including the ease of handling the cup, the volume, the ease and pleasantness of drinking from it as well as the appearance (Table 6.2). Any additional feedback provided by the resident was also noted. Average ratings for the cup were presented as a median score for each category (Appendix 11).

Table 6.2: *Testing the drinking vessels using four features related to handling, feel, volume and appeal.*

How easy do you find to lift/handle the vessel?	**Do you like how the vessels feels when you drink from it?**	**What do you think of the volume of this vessel?**	**How do you like the look of this vessel?**
1 very difficult 2 difficult 3 neither difficult nor easy 4 easy 5 very easy	1 dislike very much 2 moderately dislike 3 neither like nor dislike 4 moderately like 5 like very much	1 much too small 2 a bit too small 3 just right 4 a bit too big 5 much too big	1 dislike very much 2 moderately dislike 3 neither like nor dislike 4 moderately like 5 like very much

Results

A total of 37 residents participated. While the initial plan was to test the cups on at least ten residents, there was no need to continue testing for some as they proved impractical from the staff perspective; for example, one type of beaker was made of the material that broke easily, but also made it very difficult to fit and remove the lid. Additionally, some cups were broken during the testing and were not replaced due to the low initial ratings. Some cups were added to the initial list as they appeared in the care home or were suggested by the resident feedback. A total of 496 tests were conducted on 31 different designs.

It became apparent that the most important feature of the cup for the residents was its ease of handling, followed by the feel to drink from it and the volume. Appearance seemed to be important if there was an issue of dignity, but not for aesthetic reasons.

The residents tended to prefer a mug to a cup. The mugs in general had bigger handles and were found easier to lift. The mugs that were rated highly were made of bone china and were lighter than a standard cup. A large handle was most important, so the residents could comfortably fit four fingers in, and wide enough to provide enough grip even for those who had difficulty closing their fists. Preserving the ability to drink from ordinary cups as well as drinking independently were important factors for many residents to maintain their dignity. The cups provided by the care home were rated lower, with the residents stating that they were difficult to keep the balance and therefore easy to spill. One also remarked that:

"You have to watch your fingers not to burn them on a cup".

For those who were not able to lift the standard vessels, a good alternative was provided by offering plastic mugs (with the big handle as described previously), double handed mugs or the beakers. The preference for the alternative depended on a personal choice of the resident and what they perceived as more dignifying for them. For example, one resident presented with a double handed mug remarked:

"It was just excellent, but I would be embarrassed to use it",

…while the other one was not content with plastic stating:

"Tea tastes much better if drunk from china".

When testing a vessel for cold drinks, the plastic tumbler was preferred to the glass. The residents did not mind consuming soft drinks from plastic, which provided the advantage of relative lightness and the ease of handling due to the horizontal ridges. Additional benefit was that the cup could be converted into a beaker, which meant some residents felt less conscious drinking from it". This was also the only vessel that was rated higher than the standard beaker, which some residents seemed to accept.

Two types of specialist devices were tested: a vessel with rotating handle to reduce spilling due to the tremors, and the beaker with inserted device that dispensed small amount of fluid to be consumed at each swallow for residents with dysphagia. While the effectiveness of these devices was beneficial for some residents, the practicality and acceptability of these devices made them unpopular between many. Some residents refused to test them based on the appearance, many also tried but could not follow the instructions to use the vessels. This was of a problem for the residents with some degree of dementia, but it was also observed that even those with no cognitive impairment found the instructions difficult to follow and felt frustrated with their inability to drink.

The preferred volume for the cups and mugs tended to be between 200-250ml, but it was observed that the residents based this preference on the features of the vessel. Correlation between the volume of the cup and the volume perceived by the resident was significant, but only moderately correlated ($r= 0.415$, $p = 0.000$). Perceived volume was also negatively correlated with the ease of handling ($r= - 0.165$, $p= 0.000$) suggesting that the residents rated the volume of the vessel based on whether they were able to lift it rather than the amounts they consumed. There was no correlation between the volume and the ease of handling of the cup; and a weak, negative correlation between the weight (with and without fluid) and the ease of handling ($r= - 0.171$, $p= 0.000$; $r= - 0.140$, $p=0.002$ respectively). These findings demonstrate that the specific features of the vessels, which enabled easier handling, helped to overcome the barriers contributing to the difficulty of lifting them such as the weight or volume.

Key findings

Despite their disabilities, residents wished to maintain their ability to drink from standard vessels for as long as possible. Not being able to use this equipment compromised their dignity. Residents tended to like the mugs better because they offered better features and larger volumes than the cups. The ease of handling was the most important feature of the vessel for most of the residents. The appropriate drinking equipment have a potential to facilitate fluid intakes.

6.5.2 Introducing new drinking vessels

The problem

The decision to introduce the new drinking equipment was thought necessary following the resident feedback, which showed that the current drinking vessels hindered the residents' ability to drink and did not provide sufficient amount of fluid. Testing of the drinking equipment demonstrated that the residents' needs could be better met if the equipment matched the specific features such as lower weight, larger handle and better grip. These could improve drinking experience, promote resident independence, and allow the residents to handle larger volumes. These would subsequently increase their fluid intakes.

Purpose

The purpose of this intervention was to provide the residents with the drinking vessels that better suited their needs and preferences and to test their effectiveness in increasing fluid intakes.

Prediction: Introduction of the new vessels will increase fluid intakes of the residents.

Intervention

Four new vessels were introduced to replace the standard equipment across the unit (Table 6.3). To ensure sufficient supply for the duration of testing, four mugs and cups were ordered per resident. Since the double handed mugs and dysphagia cups were only necessary for a small number of residents, ten of each design were ordered to supply the unit.

Table 6.3: *Description of drinking vessels introduced across the unit.*

Cup/mug implemented	Description	Rationale for introducing
 China mug	Volume: 300ml Weight: 213g Weight with fluid: 513g Material: bone china Features: Lightweight, large and wide handle, to be used for hot drinks	Mug that mostly resembled one most favoured by the residents in testing.
 Sure-grip ® cup	Volume: 200ml Weight: 52g Weight with fluid: 252g Material: plastic Features: Lightweight, horizontal ridges enable easy grip, fits standard beaker lids, can be used for cold and hot drinks	Scored highly during testing, preferred to glass tumblers, could also be used as beaker with standard lids provided in a home
 Double-handled dignity ® mug	Volume: 200ml Weight: 305g Weight with fluid: 510g Material: earthenware Features: Two large and wide handles, to be used for hot drinks	Scored highly during testing, alternative for residents who had difficulty lifting standard mugs
 Dysphagia cup ®	Volume: 200ml Weight: 239g Weight with fluid: 539g Material: plastic Features: Lightweight, large and wide handle, oval shaped rim to allow the user to tilt the cup without tipping the head back, cone shaped inside to facilitate fluid flow, curved rim to encourage the fluid to flow to the front of the mouth, can be used for cold and hot drinks	Safe to use for residents with swallowing difficulties, overcomes the problems of the cup with measuring device, recommended by SALT.

Measurement

The effectiveness of this intervention was measured by observing the residents and recording the number and volume of the drinks served, amounts consumed and number of episodes when standard vessels were used to serve drinks to the residents. Feedback from staff and residents was also obtained.

Description of PDSA cycles

Due to the difficulties of replacing the equipment, it was decided that the new mugs and cups would be introduced and tested for a month as one PDSA. If successful,

the new equipment would be implemented and stay on the unit following the end of testing.

Cycle 1: The plan was to replace the existing vessels with a new design throughout the unit, old vessels would still be available but in smaller quantities. Staff would be briefed before the introduction and asked to use the new equipment unless the resident specifically requested otherwise. It was agreed that staff and residents would be given approximately two weeks to adjust to new vessels and form the opinions about them, before measurement was taken.

This happened as planned. Staff were briefed beforehand and were observed to routinely use the new vessels, although initial resistance to move towards the new equipment was observed with a few members of staff. Some commented that the mugs would be too big, the residents would find them difficult to handle and that they contained too much volume which would not be consumed. One member of staff indicated that it would have been better to provide the residents with the plastic mugs instead. Some staff were also sceptical about the double handed mugs and dysphagia cups. All staff embraced the plastic cups for the soft drinks. Soon after introduction it was noticed that the staff were reluctant to serve drinks in mugs to residents who were in beds. When asked, they replied that the residents did not like them and requested cups, but the feedback from residents suggested that they preferred to drink from the mugs. This issue was resolved at the next huddle, where the feedback from residents was given to the staff. By the time the measurement was taken, new equipment nearly replaced the old type vessels. The tea cup was used three times of the observed 101 episodes (3%) when drinks were given; glasses and beakers were returned to the kitchen and not used at all. Introduction of the mugs resulted in an increase of average fluid intakes at both, the breakfast and lunch (Figure 6.6). Many residents consumed more than 150ml, the volume of the standard cup or tumbler. When additional drinks were offered, some residents consumed up to 450ml of fluids. The amount of drinks offered before and after the introduction did not differ (1.36 vs 1.41 drinks per resident respectively) and the percentage of drinks consumed was also similar (69.5% vs 67.2%).

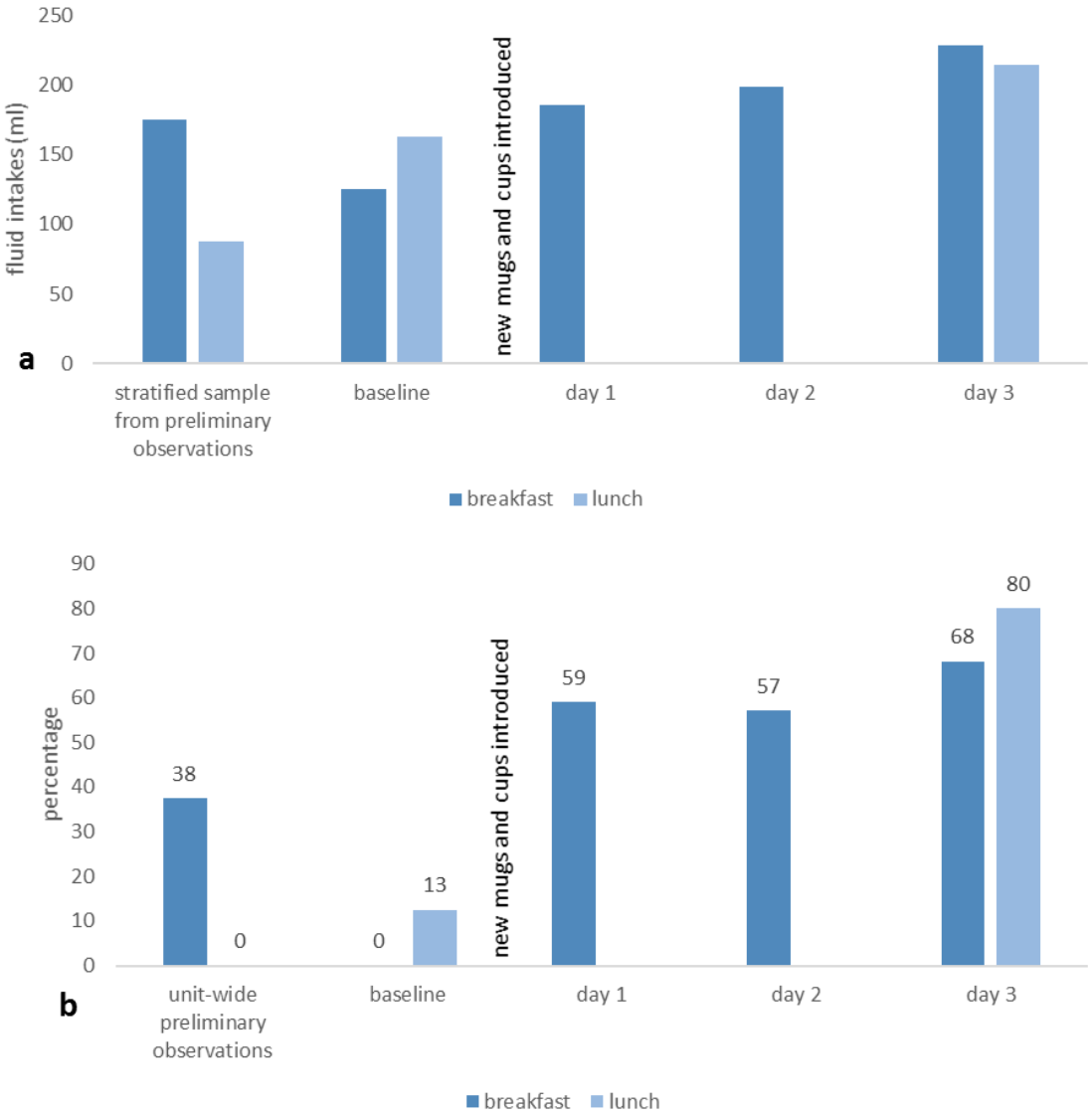

Figure 6.6: *Results of PDSA cycle for introducing new drinking vessels: a) average fluid intakes, b) proportion of residents consuming more than 150ml at the opportunity.*

Twenty residents were asked to provide feedback for the new equipment. Only three indicated that they preferred the older style tea cup to the new mug; one mentioned that she found the cup easier because she got used to it, while another one said she only liked small amount of fluid and did not see the benefit of the mug. The third resident said she found it easier but could not provide the reason why. It was observed that only two residents actively asked for the hot drinks to be provided in a small cup. Most residents said that they preferred the mugs. One of the benefits noted was the ease in handling because they were lighter and had better handles,

and therefore felt more stable in the hand. Additional benefits mentioned by the residents included larger volume and thinner walls which prevented the fluid from spilling from the corners of the mouth. Some also mentioned that they looked more attractive than the teacups. One potential problem identified by the residents was a lack of saucers if snacks were provided at the same time. After the introduction of the mugs it was noticed that the residents were often given a cake or biscuits on a paper napkin because there were few side plates available. Saucers were frequently used in place of the side plates before the mugs were introduced.

Most residents preferred the plastic tumblers to the glass. The benefits mentioned included the lightness and the horizontal ridges that enabled easy grip. As with the mug, some mentioned that they appreciated a larger volume and that the walls of the cup were thinner and prevented spillage from the corners of the lips. A few mentioned they preferred drinking from the vessel made of glass, also acknowledged that the plastic cup was probably easier to hold and more practical. Nobody was observed to ask for a glass instead of the plastic cup.

The feedback indicated that the double-handed mug fulfilled the needs of a small cohort of residents. Four out of six residents indicated that the mugs were somewhat useful but did not feel that they got to the point where they had to use it; one also mentioned that it was too heavy. There was one resident who stated that she really benefited from the mug and thought that it gave her an independence to drink on her own:

> *"if I didn't have two handles, I wouldn't be able to hold it at all".* (Resident, VDT20)

Five residents also said they had a chance to try a dysphagia cup. Of these, two mentioned they did not see a benefit drinking from it, but it was also noted that these residents did not have swallowing difficulties. Another three residents stated that they coughed less. Although two indicated that they did not like the look of the cup, they saw the benefit in drinking from it because it prevented coughing.

Sixteen residents were asked if they would prefer a newer or the older style of cups and majority (n=13) stated they preferred the new cups; another two stated they did

not mind either way. Eight out of fourteen residents asked (57%) also stated that the new equipment helped them consume more fluids.

Feedback was obtained from fifteen members of staff and the opinions expressed by the residents were confirmed. Staff thought that the mugs were lighter and easier to hold for the residents. The larger volumes meant that many residents could drink more, but also, they could be filled up to three quarters full and given to some more frail residents without the worry that they would be spilled. They also thought that the mugs saved time because they did not have to make additional cups of tea.

Plastic cups were well accepted by the staff not only because it was felt they were easier for the residents to handle, but also because they did not break and could be converted into the beakers. Staff confirmed that while a small proportion of residents benefited from the double handed mug, this was not for everyone. They thought some residents found them too heavy and that some were confused seeing two handles. For the dysphagia cup, staff mentioned it benefited some residents and they seemed to cough less when drinking from it. There seemed to be a division of opinions about their benefit, (possibly due to lack of awareness of the purpose of using them) as one staff member expressed the need to purchase more of them, while another stated that there was little use for them.

Eleven out of thirteen (85%) staff members asked thought that following the introduction of the new vessels, the residents were drinking more. Seven also (54%) stated that they made the job easier for them, while the rest said it made no difference to them which meant:

"no additional work for staff, but benefits for residents" (HCA, BDT14)

All staff preferred the new equipment to the old and identified four residents who possibly liked the teacups more than mugs, but only two were asking for them.

Post implementation

Following the introduction of the vessels, it was decided that standard equipment would not be returned to the unit. It was expected that some of the equipment would be taken to the other units, but this did not occur. Frequent feedback from the kitchen and clinical staff indicated that the mugs did not chip or break easily, but despite this, the supplies of mugs (but not the rest of the equipment) were low within

a month. These were replenished from the reserve stock, but they also highlighted the issue of sustainability of buying the equipment outside the mainstream sources.

Within a month of introducing new vessels some staff were observed to pour about a half of the mug of tea or coffee, reducing the amounts offered to the residents. When asked, the staff explained that the residents found the mugs too heavy and the amount offered had to be reduced. While this may have been a problem for some, it was observed that many residents who did not have any difficulties were also given less than before and did not appreciate receiving less fluids.

Lessons learnt

This intervention has a potential to increase fluid intakes of the residents by promoting independence and increasing the amount of fluid served to the residents. As opposed to other interventions, introducing the new vessels has additional benefit because it requires no investment of staff time. This is an excellent example of the intervention that could be introduced at the beginning of improvement work as it will help boost staff motivation and commitment towards the project. The final format of this intervention is provided in Box 6.4. Few barriers have been identified and need to be considered.

Making choices for residents: As with the fluid choices, staff assumed they knew what was best for the residents and did not ask their preferences when providing only half a mug of fluid. To avoid this, staff need to be monitored and reminded that many residents should not be assumed not being able to handle the drinking vessels independently.

Lack of awareness of the purpose of the equipment: from the staff feedback as well as observations it was evident that some staff did not understand the purpose of some of the vessels introduced. The on-going training and reminders are necessary to ensure staff can choose the vessels that most closely match the residents' needs and preferences.

Maintaining the stock: To maintain a steady stock of these mugs, it is essential to purchase them from the sources that can assure their steady supply, so they can be purchased and replenished any time.

Limitations

Box 6.4: Final format of introducing new drinking equipment

- *Catering manager:* ensure sufficient supplies of the drinking vessels are available on the unit at each drinking opportunity:
    - Mugs: double the number of the residents on unit
    - Plastic tumblers: double the number of the residents on unit
    - Double handed mugs: half the number of residents on unit
- *Catering manager:* ensure sufficient supplies of the drinking vessels are available for restocking
- *Staff on unit:* provide drinks to the residents using the vessel most appropriate to the resident needs

While introduction of the new drinking vessels resulted in more fluids being consumed by the residents, it must be noticed that this intervention on its own is not

likely to increase fluid intakes unless preferable drinks are given to the residents. The success of the new vessels was partly because larger volume meant that residents received more tea and coffee, which they liked to consume. Due to time limitations it was also not possible to assess fluid intakes at other times and the effect of this intervention on overall fluids consumed throughout the day is unknown. Additionally, considering the current lack of suitable vessels available for purchasing, the sustainability of this intervention may pose some problems to the care homes.

6.6 Dissemination to unit A

The problem

Barriers to adequate hydration, including limited opportunities to obtain drinks, lack choice of fluids offered, and inadequate drinking vessels were similar on both units, therefore it was thought that the interventions implemented on unit B could be introduced to benefit the residents on unit A.

Purpose

The purpose of this intervention was to introduce the successful strategies on unit A and determine whether they could be feasibly implemented in the new setting, and to explore contextual issues arising from introducing these changes.

Prediction: Introducing the interventions will result in increased fluid intakes for the residents.

Intervention

The dissemination included the following activities: PDT in conjunction with the Drink Menu and Refreshment Needs Guides and introducing new drinking equipment. Although the Refreshment Needs Guides were not shown to be successful in unit B, the unit manager was still keen to try these with their staff.

Measurement

Due to time limitations, most of the data obtained was from the staff and resident feedback. Quantitative data were obtained in PDSA 2 where new drinking vessels were introduced, and in PDSA 4 and 6 where PDT in conjunction with Drinks Menu was carried out in place of the afternoon tea.

Description of PDSA cycles

Cycle 1: In this cycle the plan was for the staff to ask the residents for preferences using the Drinks Menu when giving drinks to the residents at 3pm.

This went as planned, although it was observed that one HCA, who was asking the residents in the lounge used the menu but did not provide any drinks to the residents. Staff said that Drinks Menu was easy to communicate with the residents and were surprised by some residents' choices. The resident feedback was also positive. Many residents were surprised to find some of their favourite drinks were available in a home and few asked how they could purchase these drinks, as they assumed that these would not be routinely provided. It was agreed that the Drinks Menu would be tried with PDT in the following cycles.

Cycle 2: The plan was to introduce a new drinking equipment throughout the unit for a month. The staff were asked to give the drinks using the new vessels unless the resident requested otherwise.

This cycle was carried out as planned. Fluid intakes at breakfast increased from an average 158ml to 201ml. Staff and residents mentioned that they liked new equipment. It was decided that old equipment would not be returned to the unit and the new drinking vessels would be routinely used to serve drinks to the residents.

Cycle 3: The plan for this cycle was for the nurse on the unit to allocate the staff to complete the Refreshment Needs Guides. Staff were allocated to two residents each and were given a week to complete the guides.

This cycle was not carried out as planned. The nurse allocated the HCAs, but some said that they were not aware of the activity and no guides were completed. It was agreed that for next cycle each HCA will be approached individually and will be given a target for completing the guides for allocated residents.

Cycle 4: The plan was for staff to conduct PDT. Nurse on duty described PDT to the HCAs and asked them to carry it out as designed for unit B, also asking the residents for drink preferences.

This cycle was carried out as planned. All staff were present at 3pm, although this meant that it delayed the breaks for some. More residents received drinks and a greater variety of fluids was served to the residents. This resulted in an increase in

fluid consumption (Figure 6.7). However, it was also observed that residents who needed assistance were not offered drinks. Staff ad resident feedback were positive, and no issues were identified. It was agreed that in next cycle staff needed to aim to provide drinks and assistance to all residents and that PDT would be supported by using the Drinks Menu.

Cycle 5: The plan for this cycle was for HCAs to complete the guides for the residents. Staff meeting was held, and HCAs were asked to choose two residents each. After this time, HCAs were approached individually, we asked if they needed support in completing the guides and the deadline for completion was negotiated.

This cycle did not go according to plan. Only two HCAs managed to complete the activity, with others stating lack of time and not being able to obtain templates of the guides as barriers. Those HCAs who completed the guides provided limited information and it was evident that residents/family and care plans were not consulted. Following this, it was agreed that this activity should be abandoned.

Cycle 6: The plan for this cycle was to conduct PDT with Drinks Menu. Staff meeting was scheduled to brief the staff of the activity. To overcome logistic issues, PDT needed to be modified. Unit A was smaller and required only three HCAs in the afternoon, of which one would be on their lunch break. Hence two HCAs who were available at 3pm were asked to load the trolley with all drinks and distribute them to the residents, asking for preference by using the Drink Menu. They were asked to provide the drinks to the residents in the lounge first and take a trolley around the individual rooms later. After assisting all the residents who required it, HCAs were asked to go back to the lounge, offer additional drinks and prompt the residents as needed. Following this, they were asked to do the same in the individual rooms.

The activity was not conducted as intended. Staff were briefed at the short meeting beforehand, but they were reluctant and mentioned a few barriers. During the PDT, HCAs relied on the researcher to communicate with the kitchen, bring back the trolley and ensure all drinks were available. At the start of PDT, it was noticed that there was only one HCA left on the unit. The activity started, but it was not very efficient.

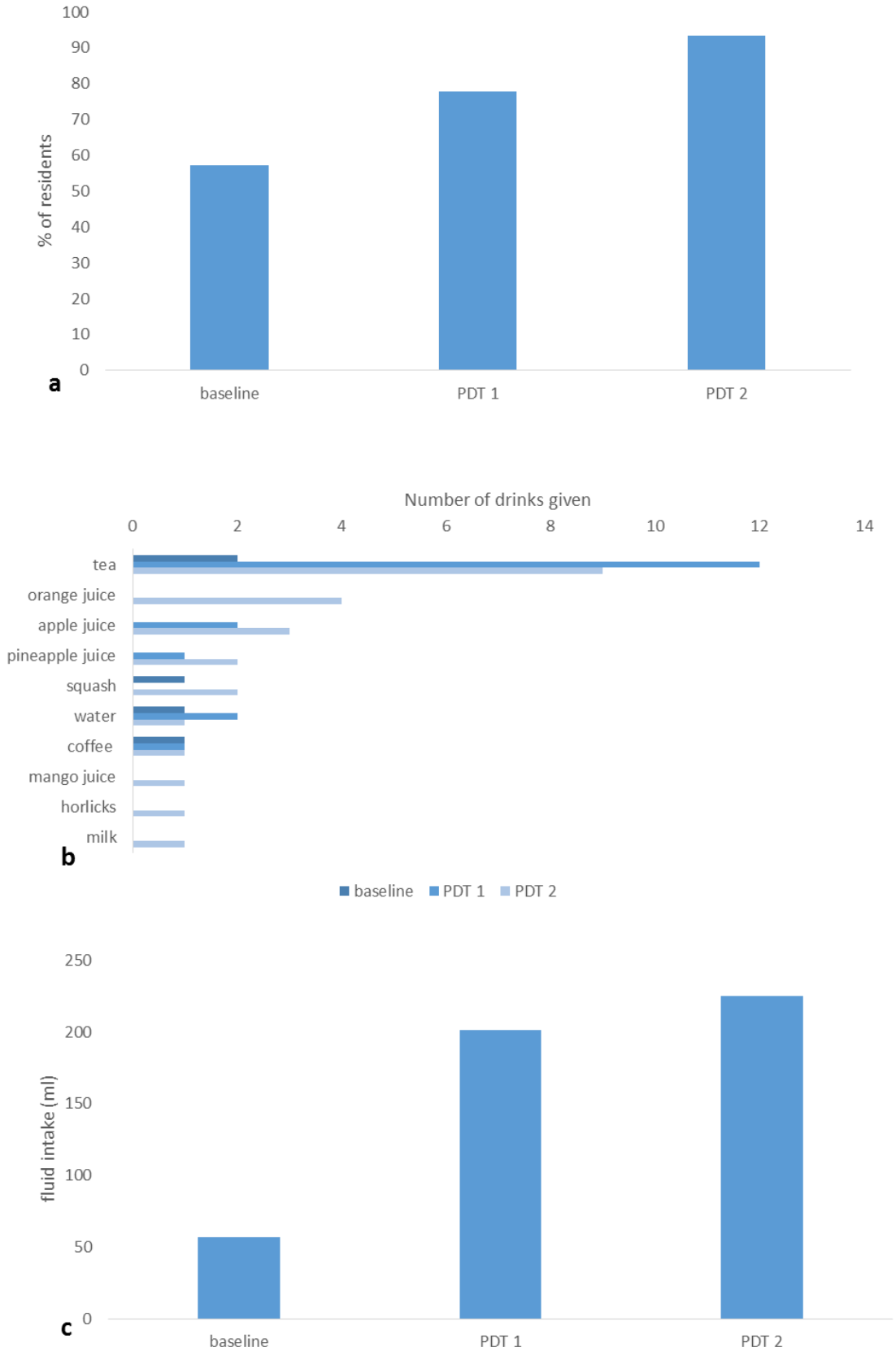

Figure 6.7: *Results of PDSA cycles for dissemination to unit A: a) proportion of residents receiving drinks, b) types and number of drinks offered, c) resident fluid intakes. Results show data for PDT 1 and 2 conducted in cycle 4 and 6 respectively.*

All residents were prompted to choose two drinks from a menu, although only one resident was offered refills. The proportion of residents given drinks and the variety of drinks offered were greater than at preliminary observations or when PDT was first conducted in cycle 4. Fluid intakes also increased. Synergistic effect of combining PDT and Drinks Menu was observed as some residents consumed up to 1000ml of fluids. It was decided that this activity could be implemented, but that allocations to breaks and tasks needed to be addressed.

Post implementation

Following the second testing of PDT and Drinks Menu in cycle 6, it was decided that these activities would be implemented. While it was thought that some logistic issues still existed, due to lack of time at the end of the project it was not feasible to continue with testing. Instead, it was agreed that if the problems persisted, it was a responsibility of the nurse to ensure staff continued to support the residents as intended. A week following the last cycle, the manager reported that the PDT was carried out by staff as intended without a prompt from the nurse and that staff were using the menu.

Observations showed that the new vessels replaced standard cups completely within a couple weeks, although double handled mugs and dysphagia cups were rarely utilised. As on unit B, approximately a month after the introduction, some equipment needed restocking.

Lessons learnt

As in unit B, PDT, Drinks Menu and new drinking equipment can be successful in increasing fluid intakes. Final format of this intervention is described in Box 6.5. Similar barriers to implementation were observed, which possibly impacted the sustainability of the interventions.

Leadership: The resistance to change was apparent before the start of the dissemination. The common worry for staff was the lack of time and not being able to complete other tasks. Leadership from senior member of staff was important to initiate the activities and demonstrate the commitment and support to staff. Middle leadership from the nurse was also necessary to further drive the activity and ensure it was conducted as intended.

Box 6.5: Final format of dissemination to unit A

- *Nurse: to* ensure all introduced interventions are implemented and monitored, and allocate HCAs to tasks and breaks
- *HCAs:* to carry out all activities as intended
    - PDT: 2x HCA load the trolley and distribute the drinks starting with the residents in the lounge, and offer refills after assisting the residents, 1x HCA on a break
    - Drinks Menu: use at all drinking opportunities including PDT, encourage residents to get a hot and cold drink
- *Catering manager:* to ensure sufficient supplies of all drinks are available throughout the day, drinks trolley with sufficient drinking equipment is available before PDT and that drinking vessels are available for restocking
- *Care home/deputy managers:* provide support and emphasise the importance of these interventions in maintaining optimal hydration

Allocations to breaks and tasks: Not dissimilar to the findings on the unit B, most of the staff took their lunch breaks around 3pm. The team leader was asked to assign staff to breaks, but this was not adhered to. Adequate staff numbers impacted the success of PDT because it was difficult to provide sufficient support for all the residents on the unit.

Availability of equipment: The staff were worried about the trolley availability for PDT, but this was communicated with the kitchen and the trolley was ready before the start. Although trolley was prepared, it was noticed that this put additional stress on the kitchen staff. It is possible that this could become a problem if the PDT was to be introduced across all eight units of the care home. The existing process of washing and restocking after meals was not efficient to support this activity and the

alternatives would be necessary. This is an example how escalating interventions into a wider setting may entail additional unforeseen difficulties and how other departments are also affected by improvement activity.

Context: Unit A was slightly smaller which required less HCAs on a shift and resulted in less staff being available at 3pm. This required different format of PDT, which highlighted the issue of context and the need to adapt the activity to overcome logistic difficulties.

Limitations

The results confirmed the effectiveness of the interventions and showed that these can be introduced across new settings with minor modifications. However, one of the issues identified was the impact of escalating these interventions across the home, which potentially affected other department, although due to time limitations of the project it was not possible to determine the extent of this being a problem. Another limitation was a small number of PDSA cycles to ensure successful implementation of the interventions on the new unit. As observed with PDT, more work was required to resolve the barriers around allocations, but this was not possible to conduct. Additional PDSA cycles and monitoring post-implementation would be necessary to ensure that the interventions were carried out as intended, however this was not possible at the end of the project.

6.7 Discussion of findings and implications for next steps

These PDSAs aiming to improve hydration of the residents indicated that Protected Drinks Time, drinks before breakfast and introducing new drinking vessels resulted in increasing fluid intakes of the residents. This was accomplished by increasing the number of residents being given drinks at the times when access to fluids was limited and more drinks given to them. Limited amount of fluids served and the infrequent opportunities to obtain fluids were identified in chapter 5 as factors contributing to low fluid consumption of the residents. Additionally, providing assistance at PDT and optimising the design of the drinking vessels helped the residents consume the fluids they received. Introducing the Drinks Menu was also shown to be effective in increasing a range of drinks offered to the residents. The results of the dissemination to unit A showed the synergistic effect of these interventions where the amount of fluids consumed at PDT more than tripled

comparing to baseline. Other interventions such as Refreshment Needs Cards, were not well accepted by staff. While these may still be feasible to explore, they may need to be adapted to other formats, including compatibility with electronic systems becoming increasingly popular.

A number of factors contributed to the success of these interventions during the running of PDSA cycles, and their sustainability following the implementation. These included the issues of equipment and supplies, environment and systems of care, and the staff skills and knowledge. Important considerations regarding the use of PDSA methodology in the care homes were also identified.

To be able to provide appropriate hydration care, staff on units need to be supported with adequate supplies of drinks and equipment. It has been observed throughout the PDT cycles that the HCAs wasted their valuable time if the trolley or the drinking vessels were not available. This resulted in HCAs not being able to focus on providing the drinks and assistance to all residents. Likewise, limited supplies of juices during the testing of Drinks Menu resulted in either staff making unnecessary visits to the kitchen or the juices not being offered to the residents. The availability of flasks with pre-made hot drinks were also critical to success of drinks before breakfast. Hence, ensuring adequate stocks of equipment and supplies enable the staff to carry out their tasks more efficiently while preparation of drinks before the activity ensures that staff are able to provide a selection of drinks to the residents. The problems with the availability of equipment and supplies could be avoided by allocating responsibilities to individual staff members and holding them responsible for their execution. This in turn requires appropriate support from the senior managers and skilled middle level leadership. The importance of support was highlighted during the testing of Drinks Menu, where concerns about the costs of the fruit juices resulted in conflicting messages sent to the staff from care home and catering managers and the team leaders. On the other hand, lack of middle leadership as observed post-implementation of PDT resulted in diffusion of responsibility and gradual deterioration of the activity.

Improving the design of drinking vessels has a potential to increase fluid intakes in care home residents. The results of resident interviews reported in chapter 5 and testing and implementation of the drinking vessels assistive devices were not well

accepted and that even the independent residents had a difficulty handling the standard vessels. This highlights the importance of optimising the drinking equipment to better meet the needs of residents, however this strategy has not been explored previously and little is known about the appropriate vessel design. As a result, majority of the vessels available on the market and not suited to meet the requirements of frail older people. This poses a particular problem to care homes wishing to provide such equipment as they need to rely on a steady supply of these vessels through mainstream care home supplier.

Problems identified during the cycles of Refreshment Needs Cards showed that on occasions, staff may also need access to other equipment such as computers and printers, which may not be typically associated with their roles. The need for this equipment and the ways this can be made accessible to staff should be clearly communicated, and provision supported by the senior management. As with PDT, clear allocations to responsibilities could help avoid the issues of access to equipment.

Chapter 5 previously identified that inappropriate systems did not support staff in providing appropriate hydration care for the residents, hence it is not surprising that these were found to be key factors in the success of the interventions. Planning for PDT and dissemination of the interventions to another unit show the importance of considering these systems at the start of the activity. For example, since the unit did not have a dishwasher and the crockery had to be taken to the distant kitchen, planning required consideration of contextual factors such as who would be able to collect the trolley with used crockery after lunch, how long it would take for the crockery to be washed, and how the trolley would be returned to the unit. Since the activity interfered with lunch breaks, which for many reasons had to be taken between 2-4pm, allocations had to be carefully planned to ensure that staff were allowed to take breaks but at the same time sufficient number of HCAs were present for PDT. While PDT interfered with breaks, it was also recognised that the timing for it could not change as starting it too early would result in residents not willing to consume the drinks and starting too late would interfere with other staff responsibilities such as changing resident pads before dinner. During the dissemination to unit A, it was evident that while similar issues existed, they required different solutions to fit the context of this unit. For example, less staff on duty meant

that small changes had to be introduced to the final format of PDT. Also, pressure of kitchen staff to prepare two trolleys for PDT illustrates how the operation on the units works but also how systems outside the units need to be considered.

Current operating procedures leave clinical staff, especially HCAs with a range of competing demands, over which they have no control. Devoting time to conducting PDT resulted in staff worrying about completion of other tasks, especially those relating to personal hygiene. While the personal hygiene may not have been particularly promoted as primary task by the managers, clinical staff see it as a priority. This may explain why PDT was difficult to sustain and gradually reverted to its previous version of serving the afternoon tea. To avoid this problem, consistent role modelling and senior support are necessary, but as it has been observed during the creation of Refreshment Needs Cards, the improvement activities are not seen as an integral part of the job. Instead, improvement is considered as additional task, which adds to workload and at times also interferes with the everyday activities. Drinks before breakfast support this finding as it has been identified that critical to the success of this activity was linking it to an existing task, where the transfer of the residents provided a point of contact at which an opportunity arose to offer the residents at drinks. On the other hand, expecting the staff to conduct another activity similar PDT around this time was not realistic and most likely would not be successful.

The experience of planning for drinks before breakfast also highlighted the issue of location of residents. Chapter 5 previously identified that residents in communal areas such as dining room at mealtimes and lounge between were more likely to obtain drinks than those located in their own rooms. Two major factors influence the occurrence of this phenomenon. Firstly, providing drinks to a group of residents at the same time is easier than distributing individual drinks to the residents dispersed throughout the unit. Considering the competing demands of the tasks, the staff did not always think of providing fluids to the residents and it is possible that when addressing hydration needs of one resident would prompt the staff to provide drinks and assistance for others. Additionally, the particular layout of the units in the home required staff to make long journeys from residents' rooms to the kitchenette, which consumed the time they allocated for performing other tasks. This also explains why the residents who required assistance to drinks were frequently not given drinks as

this interfered with staff time of providing personal care. This is an important consideration for the leadership, which needs to focus on influencing staff perception that hydration is equal if not superior to other parts of care that they provide. To reinforce message, leadership should focus on assigning allocations to hydration tasks, prompting and monitoring and role modelling the best practice.

Lack of awareness affects the quality of care provided. Throughout the project it was observed that staff did not always have skills and knowledge to care for the residents. Training was requested by staff and was available throughout the entire period of improvement activities, but some problems persisted. Lack of awareness led the staff to believe that they provided a good quality care to their residents and many of them thought that hydration care did not require improvement. In particular, staff were not aware of the limited opportunities for receiving drinks and the importance of providing a choice of fluids. Neither were they aware that needs and preferences of the residents could change either on day-to-day basis or over time. Some staff were therefore resistant to change as they did not perceive hydration to be a problem in the home. Staff also observed to have limited skills to provide safe care for the residents such as appropriate positioning, feeding and choosing appropriate vessels for serving fluids. These practical skills are usually learnt ‘on the job’, but the prevalent inappropriate techniques prevented the new staff from learning and recognising unsafe practice.

Limited communications skills of the clinical staff also hindered their ability to provide effective hydration care. Using the Drinks Menu exemplifies how staff reluctance to communicate with the residents and facilitate choice, who often quoted lack of time and residents’ disabilities as the barriers to communication. While the staff made choices for the residents because they genuinely believed they knew what the residents wanted to drink, it was also evident that they thought the residents did not have capacity to make decisions for themselves. As a result, staff perceived the residents stereotypically as helpless and less competent, which led to the culture of infantilising and patronising. As a result, staff did not develop the skills that would enable them to effectively communicate with the residents and reduced their interaction to minimum. Instead, they took it upon themselves to make choices for the residents. Examples of this included the feedback of staff that the residents were not able to use the drinks menu or when they limited the amount of fluid served in

the new drinking vessels. Additionally, via testing of the Refreshment Needs Cards, it was observed that majority of the communication between the staff was in a verbal form. Care plans as well as the Refreshment Needs Cards were rarely referred to by the staff, which suggests that staff were not comfortable to use the information in the written form.

Feedback from staff indicated that hydration-specific training should be provided to all HCAs at induction. This may be particularly important since despite observing unsafe practice, many staff regarded their hydration knowledge highly. Training therefore helped to raise awareness and teach the staff essential skills related to hydration care, although few barriers to providing training were identified. Throughout the improvement project, the proportion of the staff who attended hydration training was low. This prevented any attempts of these staff to be able to implement the learning into practice, because upon the return to the unit they worked along the staff who did not undergo the training. As observed with other interventions, lack of support from the leadership and the operational systems in the home prevented the staff from attending the training sessions. An example of the operational issues was that the shifts were designed around specific tasks in such a way that staff were not able to stop the activities for two hours to attend the training. Instead, the staff were expected to attend these on their days off. Since the support for the training was low, many staff did not see this as mandatory and did not attend the scheduled sessions. This problem could have been avoided if new staff were given this training at induction, but despite a high turnover of staff, this training was only provided to a few. Although staff who attended the training indicated they intended to change in their practice, observations of hydration care suggested that this did not occur, therefore the use of training huddles was introduced. These proved to be successful because they targeted the entire staff on the shift, reinforced key messages relevant to undergoing improvement activities, and required little time to conduct. As with other activities, this required the input of the unit team leader to organise the huddles and ensure all staff were present.

The entire intervention phase was time consuming and required researcher to visit frequently. Staff in a care home relied on researcher input to plan the interventions, remind and lead the staff, as well as collect and analyse the data. This may be because staff did not see improvement work as essential or possibly because they

lacked confidence to carry it out by themselves. The latter is possible because lack of staff knowledge and skills to carry out an improvement project was evident. Of particular issue were PDSA cycles, where staff found it difficult to understand why they were expected to go back to an old routine after the testing. They felt that this practice sent mixed messages to the staff in terms of what they were required to do. In addition to being time consuming, the need to oversee the appropriate conduct of interventions also posed a problem because researcher had no authority to command staff to carry out the activities but was required to take leadership on this.

Despite some barriers, PDSA cycles were found to be an effective methodology for implementing changes. Testing on a small scale enabled identification of the barriers to the conduct of some interventions. This helped to identify a number of contextual issues which affected practicality of the interventions before they were implemented. However, it was sometimes noted that some staff did not provide reliable feedback for the PDSA cycles. This resulted in some interventions being escalated or implemented only to identify that a number of contextual issues still existed and prevented staff from conducting the interventions as intended. It was not possible to identify reasons for this behaviour, but it is likely that it could be a result of social desirability bias. Another possibility is that the staff simply found it easier if they reported no problems, so they did not waste their time providing lengthy feedback to the researcher.

There are some limitations to this work that need to be considered. Firstly, it would have been beneficial to set up specific measures to assess implemented interventions over time. Process measures would monitor whether new routines were successfully implemented and would identify early if the staff were regressing to older processes. However, given unreliability of the documentation, process measures could only be set up with considerable investment of researcher time, who would be required to be present every day to collect this data. Secondly, there was a risk that the feedback about the interventions obtained from staff and residents during the testing could have been affected by social desirability bias. While there was no evidence of this from resident perspective, it is possible that they would want to avoid negative feedback in fear that this would compromise their care. Staff on the other hand were frequently found to report no barriers to conducting PDSAs, with problems emerging later. This suggests that staff were not willing to share negative

findings with research team. To avoid this, staff were frequently reminded and encouraged to report any barriers they identified. Additionally, the results of drink tasting may not reflect the preferences of all older people or residents of other care homes. Steps were taken to ensure residents from different age groups and backgrounds were included to represent the views of a wider population, but due to the limited number of residents, majority of whom were white British nationals, it would be difficult to conclude whether these findings were generalizable to other populations. It was evident that cultural background played an important role in drink preference. There is also a potential limitation to the testing of the cups. Cups obtained for testing were based on characteristics identified by the residents from preliminary interviews and represented the vessels available for purchasing at that time. Following the testing, more features were identified, but it was also demonstrated that finding vessels suitable for older people was difficult. Since the drinking vessels were tested in comparison to a standard teacup not well accepted by the residents, it is possible that residents were giving more favourable ratings to the new equipment. Finally, the results of the dissemination to another unit are limited but highlight the barriers that are context specific. It is therefore possible that some of the barriers and facilitators described here would not apply to other care homes. However, it could also be argued that many of the described barriers are a result of a widespread culture, hence they may be similar in most settings.

In conclusion, the results of the PDSAs showed that increasing opportunities to receive drinks, preference compliance and improving the design of the drinking vessels can be effective to increase fluid intakes of care home residents. To ensure the interventions are successfully implemented, there is a need for strong leadership, which in turn positively influences systems in place, availability of equipment and supplies as well as the ability and willingness of staff to provide good quality of care. Next chapter describes the effect of these interventions on long-term fluid intakes and health outcomes of the residents.

Chapter 7: Impact of improvement activity

This chapter describes the overall effect of the interventions (presented in Chapter 6) on fluid intakes and the health outcomes of the residents.

Measurement is an important part of improvement because it informs the team whether the changes truly lead to better outcomes. Measurement for Improvement is different than the measurement in research. Firstly, its aim is to assess how well the system is performing and to establish how it should be performing following the improvement. Secondly, data is collected frequently at different time intervals to monitor progress of the improvement work over time and is collected without an attempt to control for confounders, which cannot be avoided in the real setting.

7.1 Objectives

The purpose of this part of the research was to evaluate whether interventions influenced fluid intakes and health outcomes of the residents. The intention was to systematically collect data on potential markers of hydration status to determine whether introduced changes resulted in sustained improvement.

7.2 Methods

Improvement projects usually aim to derive their measures from data routinely collected in practice. This was difficult to achieve because, as shown in Chapter 5, staff only recorded fluid intakes for a small proportion of the residents and when it was recorded, it did not always reflect the actual intakes. Data on health outcomes was recorded in the individual care plans and nursing notes making it difficult to retrieve and monitor for all residents. Laxative and antibiotic consumption was the only information readily available from medication charts. Hence, it was necessary to find alternative methods for collecting the relevant data. The list of measures collected throughout the project and the rationale for using them is described in Table 7.1. The following sections describe methods for data collection and analysis associated with each measure. All measurements were collected on unit B, where most of the improvement activity took place.

***Table 7.1**: Measures used to monitor the improvement progress.*

Measure	Scale	Rationale	Data collection methods
Fluids served and consumed			
Fluids served to the residents	Mean amount (ml)/day	Determined whether the residents were given and consumed sufficient amounts to drink	Observations
Amount consumed by residents			
Hydration Linked Events			
Urinary tract infections	Incidence/1000 resident days	Measured effect on health, identified possible association with dehydration or insufficient fluid consumption	Nurse recall
Respiratory tract infections			
Constipation			
Delirium			
Falls			
Diagnosis of dehydration			
Hospital admission			
Medication use			
Laxatives	Mean no of doses/resident/day	Measured effect on health, associated with constipation, routinely available data	Drug chart
Antibiotics	No of prescriptions/1000 resident days	Measured effect on health, associated with infections, routinely available data	Drug chart

7.2.1 Observations of fluids served and consumed

Observations of individual fluid intakes were undertaken to estimate the amount of fluids offered to and consumed by the residents. This approach was necessary because preliminary observations identified fluid intake charts were not completed accurately and that only the residents who were at risk of consuming insufficient amounts had their fluid intakes recorded. This made the fluid charts unsuitable for the purpose of measuring the progress, and routine observations were deemed to be more appropriate. These were carried throughout the project with the approximate frequency of one per four weeks. Data were collected using tools and method for preliminary individual observations, already described in section 5.2.2, except that six residents were randomly selected at each time point (Appendix 12). This was done by entering room numbers into a random number generator (https://www.random.org/). Excluded from observations were residents who were fed exclusively by PEG tube or were identified as approaching the end of life. Whenever it was not possible to observe a resident (e.g. in hospital), the adjacent room with a

higher number was chosen. Observations were carried out for a 15-hour period between 6am and 9pm. Data collected included the amount of fluids served and consumed and type of drinks served.

Data analysis
Data were input into Microsoft Excel and SPSS statistical software and were used to calculate:

- Mean amount of fluids served and consumed. These were presented using run charts as described in section 3.2.3.
- Times the residents obtained their first and last drinks. These were presented as a proportion of residents receiving the drinks at different times
- Length of opportunity to obtain fluids (a time difference between the first and last drink given), presented as a mean (+ SD)
- percentage of fluids offered at mealtimes, presented as mean
- percentage of the fluids received from fluid rich foods, presented as mean

Where comparisons between different types of residents were made (e.g. fluid intakes, percentage of fluids offered at mealtimes and proportion of fluids derived from fluid rich foods), these were calculated using one-way ANOVA.

7.2.2 Hydration Linked Events

Data on urinary and respiratory infections, falls, delirium, constipation, diagnoses of dehydration and the hospital admissions were collectively named Hydration Linked Events (HLE). The term was first used by Mentes and Culp (2003) to describe the outcome measures after the intervention. In this his study HLE included incidence of UTI, respiratory infections and delirium. Literature review (Chapter 2) identified that constipation and hospital admissions were also associated with insufficient fluid intakes. Diagnosis of dehydration was included as it was hypothesised that improved hydration care and subsequent increases in fluid intakes would naturally result in the decrease of this outcome. Data were collected weekly using a collection tool specifically designed to capture the incidence of each HLE (Appendix 12). The nurse on duty was asked to recall if any of the residents had experienced in the last seven

days. While this method was sensitive to recall bias, in the absence of other reliable methods to collect this data, it provided the best alternative.

Data analysis
Data were input into Microsoft Excel spreadsheet, aggregated for the period between observations of fluid intakes and calculated as incidence per 1000 resident days. Data were used to create run charts as described previously (section 3.2.3).

7.2.3 Laxative and antibiotic use

Data on laxative consumption and antibiotic prescription were collected from the drug charts of the residents. The care home had a system for documenting medication given to the residents on four-weekly charts. These were reviewed at the end of each period. Data were collected number of doses of laxatives given and number of courses of antibiotic therapy for each day during the four-week period.

Data analysis
The denominator, i.e. the total number of resident days in the four-week period was used to calculate the incidence of HLE, courses of antibiotic therapy, and the mean doses of laxatives. This was done by adding the number of residents present on the unit each day from the medication chart.

Laxative consumption was calculated by dividing the number of laxatives given by the denominator. Data was used to generate the weekly mean number of doses of laxatives per resident per day. Data were used to create an XmR chart as described in section 3.2.3. Baseline mean, as well as the upper and lower control limits for the chart were calculated retrospectively for four months until the start of the first intervention (training session). These were recalculated following the observed significant decrease in the number of laxatives given.

The incidence of antibiotic prescription was aggregated for the period between the observations of fluid intakes due to their relatively rare occurrence. The number of courses of antibiotics were divided by denominator and presented as incidence per 1000 resident days. This data was used to create a run chart. The median was calculated prospectively from the first ten points available.

7.3 Results

7.3.1 Observations of fluids served and consumed

Data were collected over a one-year period during which time 13 data points were obtained. Data were collected on six residents for all but three episodes when observations of all residents were not possible (e.g. resident taken to hospital). The mean fluid intakes throughout the project were 1159ml (±502ml). Following the introduction of the first interventions, fluid intakes increased and remained relatively high for approximately four months (Period from 05/05/16 to 21/07/16, Figure 7.1). From the next observation point (11/08/16), fluid intakes have decreased, although not to the level observed at baseline. The decrease coincided with an internal and external staff turnover. Following the meeting with the care home and the clinical services managers, the attempt was made to reintroduce the interventions previously implemented, together with huddle training and introduction of the refreshment needs guides. This resulted in fluid intakes increasing (09/11/16). Fluid intakes have further increased following the introduction of the new equipment (07/12/16). The decrease was again observed at the end of the project (04/01/17). Despite the decrease, fluid intakes were higher than that observed at baseline.

It was observed that some residents consistently consumed more fluids than that observed at baseline. For example, one independent resident whose fluid intakes were 1060ml and 725ml before the interventions started, consistently consumed more than 1500ml of fluids afterwards. Another resident who needed prompting consumed 650ml at baseline, increased their fluid intakes to above 1000ml for five out of six episodes of the observation.

Relationship between fluids served and consumed

Fluid intakes correlated highly with the amount of fluids served to the residents. Pearson's correlation confirmed a strong, positive relationship between the amount of fluids offered and consumed ($r=0.635$; $p=0.000$). The residents consumed on average 66% (±18.2%) of the fluids served, which was consistent throughout the course of the study. Fluids given to the residents were initially below the 1500ml recommended fluid intakes, although these also increased throughout the project (Figure 7.2).

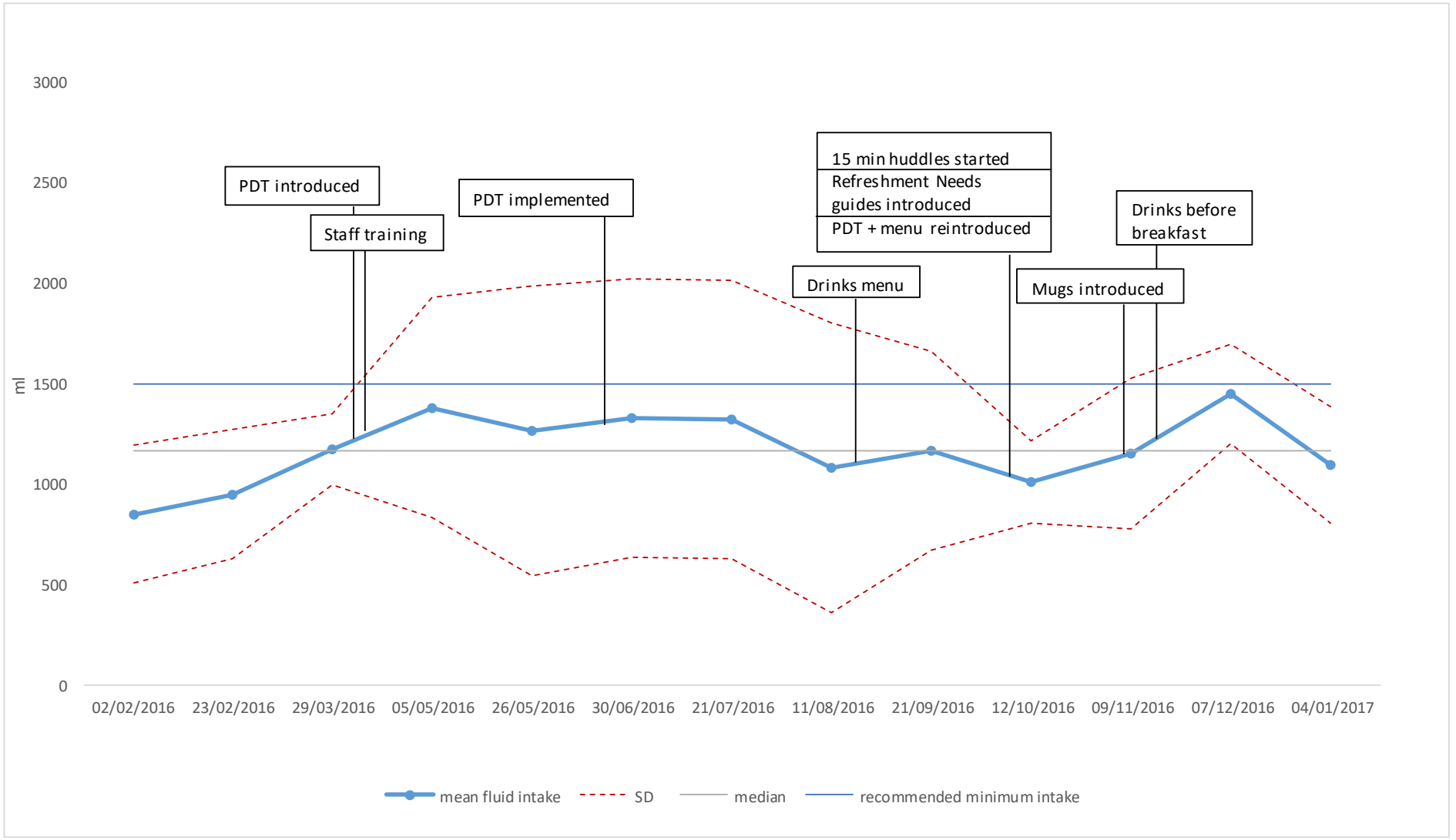

Figure 7.1: *Average fluid intake data collected routinely throughout the project. Six randomly selected residents were used for observations, median was calculated prospectively from the first ten data points.*

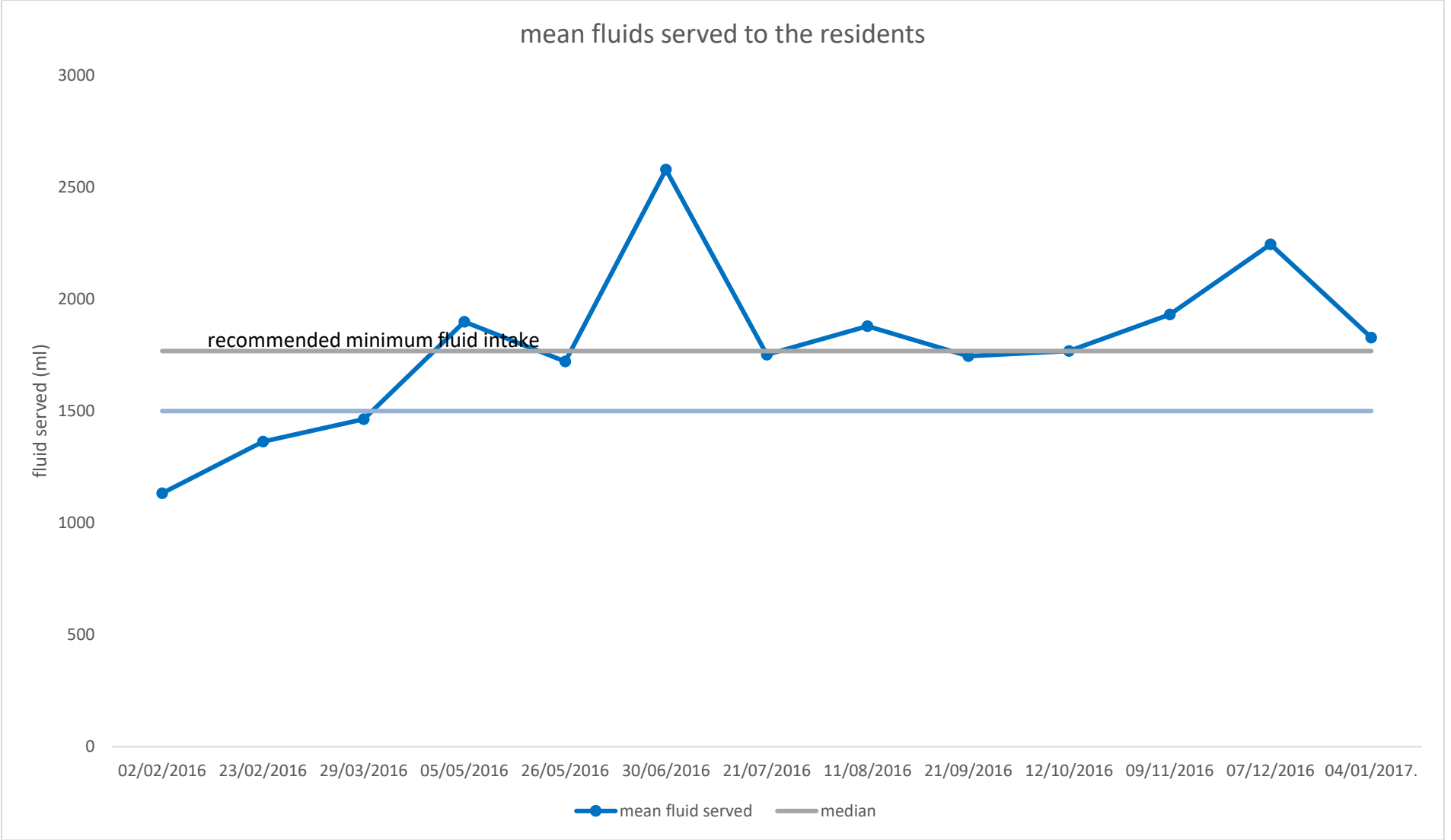

Figure 7.2: *Average fluids served to the residents throughout the project. Six randomly selected residents were used for observations, median was calculated prospectively from the first ten data points available.*

Resident typology and fluid intakes

Fluid intakes throughout the project were significantly different for different types of the residents (Table 7.2). The residents who were able to drink their fluids without assistance (i.e. “independent” and “needs assistance”) were given fluids in the excess of the recommended intakes but still consumed less than the minimum 1500ml target. However, the residents who required full assistance received less than the minimum recommended amount and consumed about two thirds of the fluids offered, demonstrating that they were neither given adequate amounts nor support to help them drink. The differences between the groups were even more evident when excluding the residents who received help from the family (*p*=0.000 for both fluids offered and consumed). Fluids offered and consumed were insufficient for all groups but were extremely low for those who needed assistance.

Table 7.2: *Mean fluids offered and consumed for different types of the residents throughout the project. All variables were compared using One-way ANOVA. Values presented as mean (±SD)*

Resident type	**Fluids offered (ml) *p*=0.000**	**Fluids consumed (ml) *p*=0.035**	**% of fluids consumed *p*=0.008**	**% offered at mealtimes *p*=0.008**	**% of fluids from food *p*=0.017**
Independent	1812 (±493)	1237 (±444)	69% (±15)	56% (±14)	19% (±9)
Needs prompting	2575 (±589)	1236 (±615)	49% (±25)	42% (±15)	19% (±10)
Needs full assistance	1437 (±810)	920 (±546)	65% (±19)	62% (±19)	26% (13%)

Length of hydration care

The mean length of hydration care was 9 hours and 39 minutes (±1.59). This was calculated as a time between the first and the last drink received by the resident on a given day. The mean length of hydration care roughly represented the time between breakfast and dinner. For some residents, the opportunity was as short as 6 hours when the first drink was given late at breakfast and the last drink given before dinner. The latter was observed three times on separate occasions in three different types of the residents. All residents were in their own rooms at that time. The length of hydration care and the time the first and last drinks were given did not vary significantly for different types of residents. Majority of the residents (63%) received their first drink at or after 9am, and those requiring assistance tended to get their

drinks slightly later than independent residents (Figure 7.3). Similarly, almost a half (49%) of the residents had their last drink at 6pm or before (Figure 7.4).

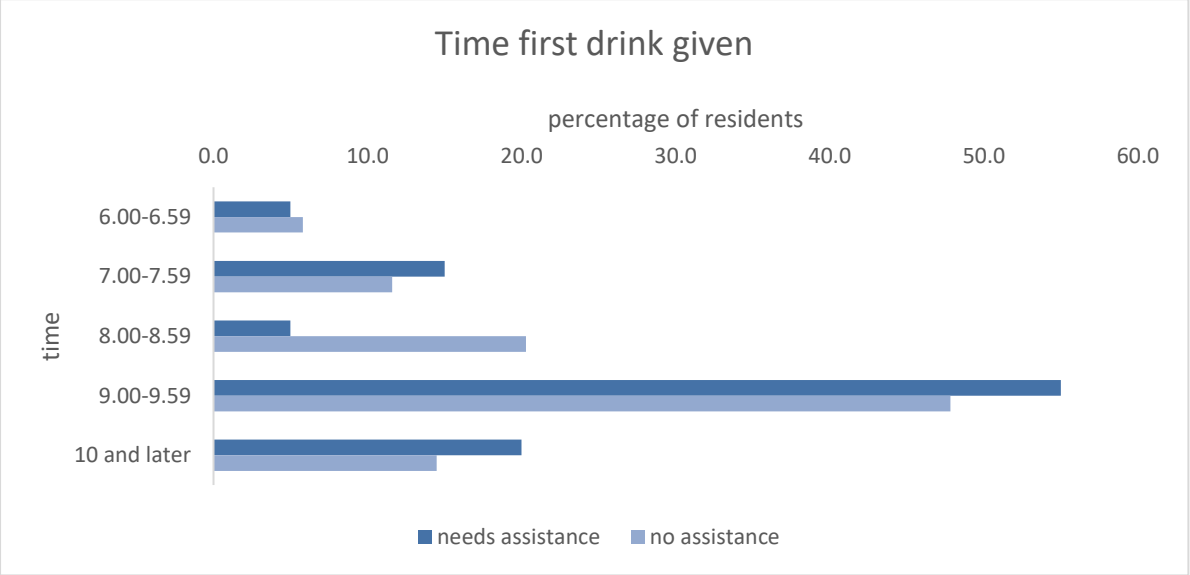

***Figure 7.3**: Proportion of residents receiving their first drinks at different times of the morning period.*

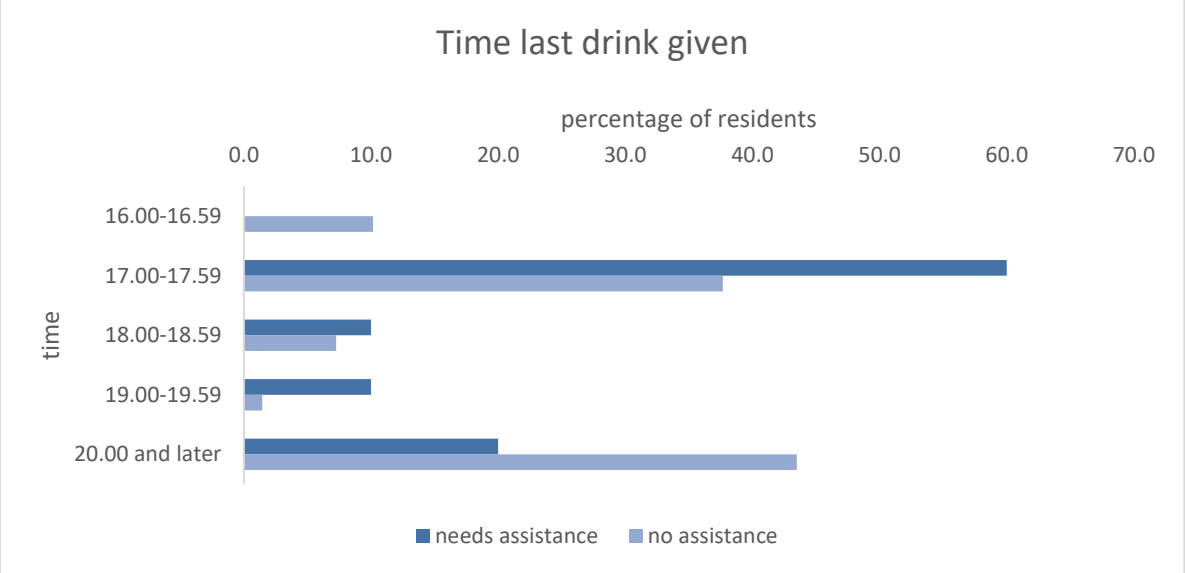

***Figure 7.4:** Proportion of the residents receiving their last drinks at different times in the afternoon and evening.*

7.3.2 Hydration Linked Events

There was a concern in the quality of the data provided by the nurses. For instance, delirium was especially difficult to assess. The problem often related to the nurses sometimes mistaking the signs of delirium for the behavioural issues associated with their diagnosed dementia, stating the residents were '*sometimes confused*'. On the

other hand, some residents with no cognitive impairment who displayed their anger were thought to suffer from delirium. Upon reviewing the medication charts for laxative use, it was evident that at times residents had been given enemas or larger doses of laxatives, clearly indicating constipation, but these did not always match the data reported by the nurses. Diagnosis of dehydration was rare and only four incidences were reported throughout the study period. As a consequence, it was decided that the data on delirium, constipation and the diagnosis of dehydration should not be included in the analysis.

The incidence of HLE did not seem to be affected by any changes to fluid intakes (Figure 7.5), except for hospital admissions, which were strongly negatively correlated with the fluid intakes ($r = -0.713$, $p = 0.01$). The noticeable sudden drop in UTI in September could not be entirely attributed to the changes in hydration status as it coincided with the care home policy for diagnosing the UTI. Up to this point, the diagnosis of this condition depended on the nurses' judgement and was not always supported by the results of the urine analysis. Discussion with the GP about the overuse of antibiotics and the risk of encouraging resistant pathogens resulted in the change for diagnosing UTI and prescribing the antimicrobial treatment. The incidence of chest infections significantly decreased from September onwards (shift of the six consecutive points to below median), which could be associated with an observed increase in fluid intakes. There was no difference in the incidence of falls and hospital admissions. Average incidence rates of HLEs throughout the project are presented in Figure 7.6

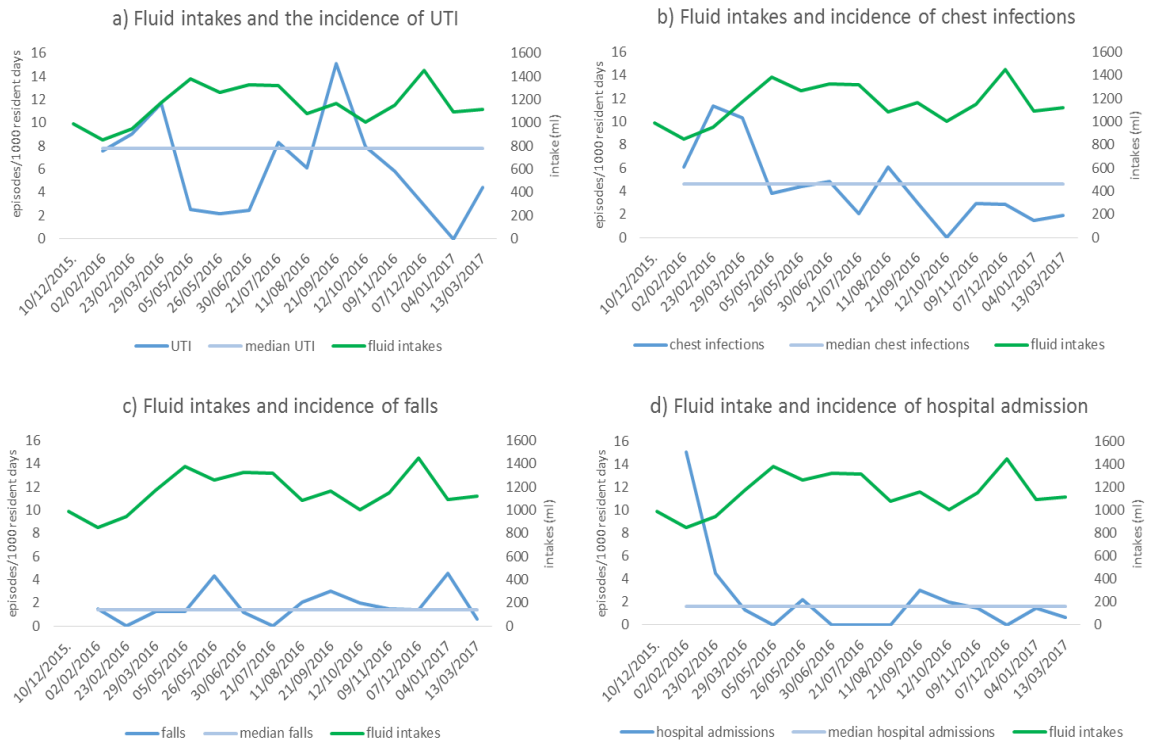

Figure 7.5: *Relationship between fluid intakes and Hydration Linked Events: UTI (a), chest infections (b), falls (c) and hospital admissions (d). Median calculated prospectively from the first ten data points available.*

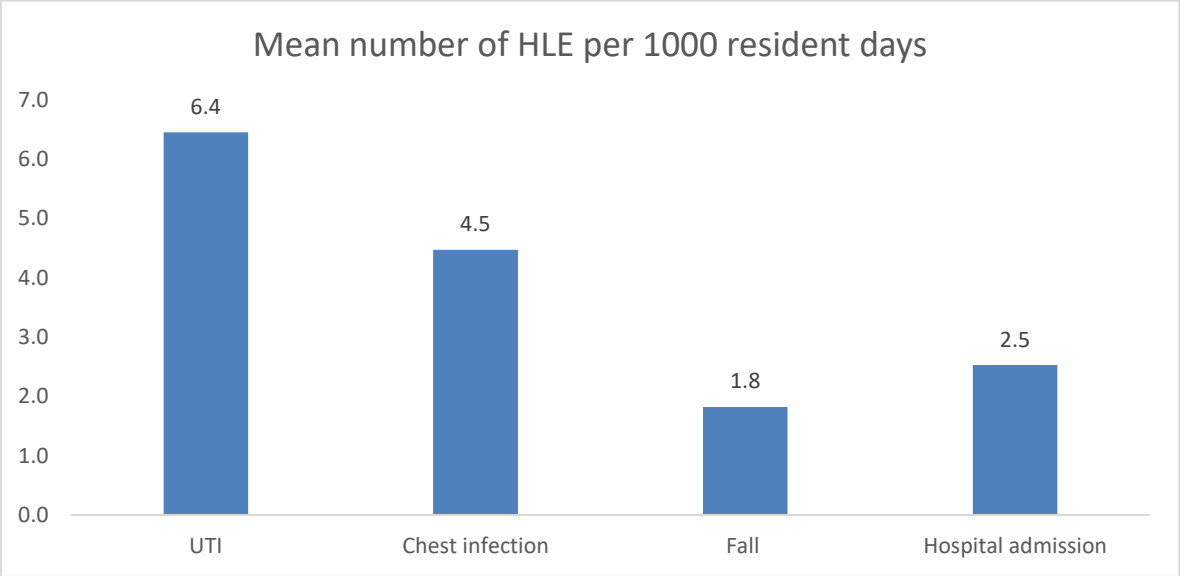

Figure 7.6: *Mean number of Hydration Linked Events per 1000 resident days throughout the project.*

7.3.3 Laxative and antibiotic use

There was a significant improvement in the laxative use over time, decreasing from 0.83 (±0.09) doses per resident per day at baseline to 6.9 (±0.12) from October

onwards. Overall, throughout the project, the mean number of doses was 0.81 per resident per day (± 0.16).

The changes to laxative consumption are shown in Figure 7.7. The initial significant increase occurred at the start of the project. It is not clear why the increase occurred, but it was suggested that it could have been due to one nurse leaving the care home and that the temporary staff were less likely to ask the residents if the laxatives were required. The first significant decrease in laxative consumption was observed in August. The sustained change was observed with a second decrease in October (23/10/16), at which point it was decided that the change was most likely due to the improvement activity and the mean and the control limits were recalculated. It was expected that a hotter weather in summer months would affect the laxative consumption, but this was not observed. The mean laxative consumption decreased at the end of July and remained lower for the month of August. Additionally, during the data collection, it was observed that some residents previously prescribed laxatives were taken off prescription or had their doses reduced.

There seemed to be no effect on prescription of antibiotics (Figure 7.8). Mean antimicrobial prescription throughout the entire project was 8.06 episodes/1000 resident days (±3.38). There was a sharp increase in number of antibiotic prescriptions during the summer.

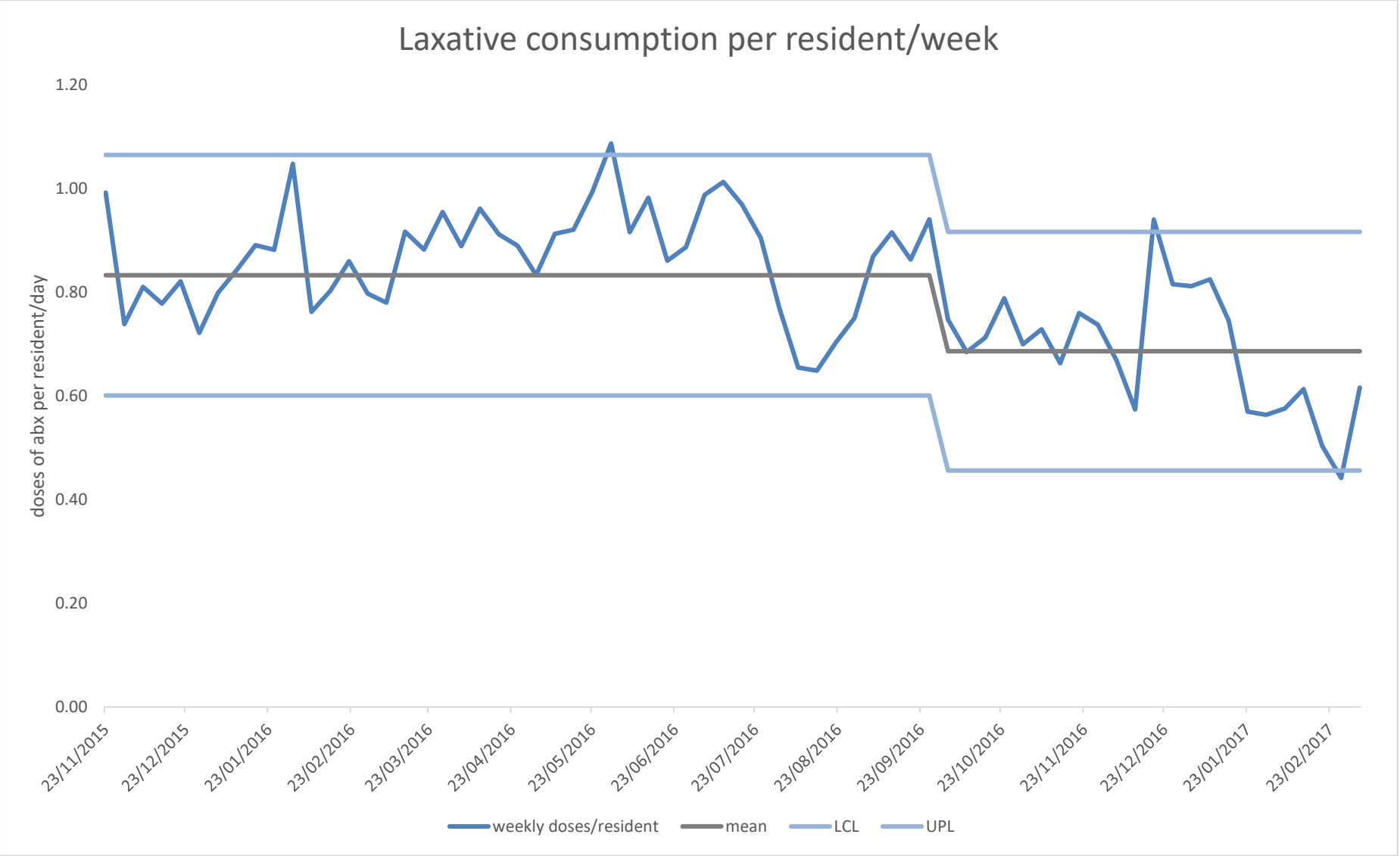

Figure 7.7: *Trends in laxative use aggregated to weekly intervals for the duration of the research project.*

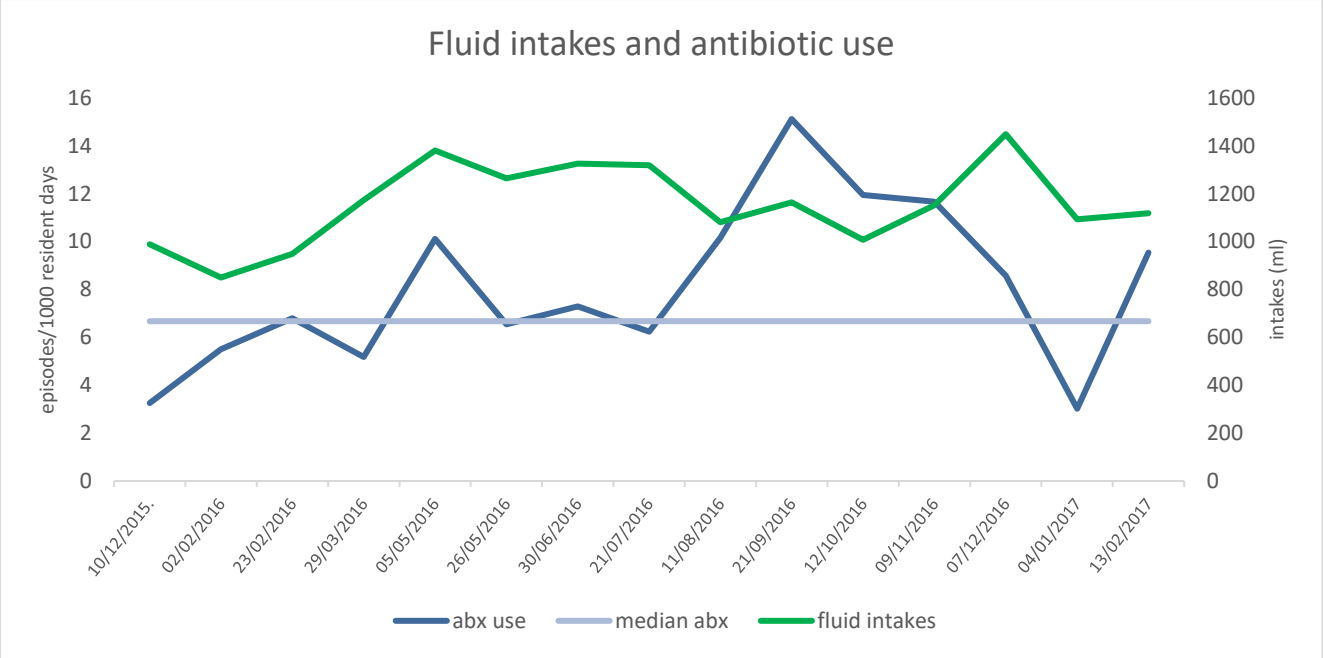

Figure 7.8: *Trends in antimicrobial prescribing throughout the project.*

7.4 Discussion of findings

Results of this chapter demonstrated that the interventions to increase fluid consumption influenced daily fluid intakes but were difficult to sustain. It was twice observed that fluid intakes increased following the introduction of improvement activities but deteriorated afterwards. Both observed increases in fluid intakes were due to the introduced changes as well as raised awareness of importance of providing preferred drinks achieved by staff training and the additional huddles. The second increase was also partly due to change in the vessel volume, which meant that while staff provided the same hydration care, the amount of fluids served to the residents increased.

Both decreases coincided with an internal and external staff turnover, which negatively impacted the progress. The new HCA teams were not immediately aware of the project, did not receive hydration training and were not aware of the interventions. While leadership would have been effective, the staff turnover also included the team leaders in both cases. The second decrease also followed an introduction of the new electronic system. Staff attention was diverted away from hydration project as the care home and the deputy manager prioritised the implementation of the electronic system. By the end of the project, some

implemented changes were either abandoned or adapted by the staff to fit the routine they were used to and/or thought the most appropriate. This highlights the challenges to sustainability of these interventions as reported in previous chapter and emphasises the need for strong leadership and support of the senior management participating in the project. Despite the decrease, fluid intakes were higher than that observed at baseline.

Overall, fluid intakes were below the recommended minimum 1500ml and never achieved this target. Low fluid intakes were mostly due to inadequate amounts served. This in turn can be explained by a limited number of opportunities when drinks were served, as well as a short window of opportunity during which time these opportunities existed. This was evidenced by an observation that less than a half of the residents obtained drinks after dinner or before breakfast.

The amounts of fluids offered and consumed were insufficient for all types of residents but were very low for those who needed assistance. This was particularly noticeable at the early stages of the project when the standard variation was observed to be wide suggesting that the interventions benefited only some residents. Looking at the individual data from this period showed that the residents with highest fluid intakes were those who were able to drink independently. For those who needed assistance to drink, fluid intakes remained low. The narrower trends later in the project suggest that hydration care was more consistent for all types of residents. However, it was noted that intakes for individual residents have increased, with some residents being able to consume more fluids consistently.

One interesting observation was that residents were rarely observed to request the drinks. This is important because it shows that even the most functional residents are almost entirely dependent on staff to present them with opportunities to obtain drinks. This creates a problem because staff are under impression that additional drinks are requested by the residents throughout the day. It was unclear whether the residents were unable or unwilling to communicate their needs. However early observations on unit A showed that residents asked for drinks frequently, but the requested drinks were not always delivered promptly. It could be that the residents were reluctant to repeatedly ask for drinks or they could have become deconditioned and unable to recognise their care needs.

In general, there was little evidence that changes in fluid intakes had influence on health outcomes. Incidence of hospital admissions, chest infections and laxative use were the only outcomes that changed significantly. While it could be argued that the health effects were not observed because the aim of the research was not entirely achieved, there were other factors that influenced this. Incidence of UTI was high at the start of the project, most likely due to the policies of this condition is diagnosed. The sharp increase at the end of summer before policy change, suggests that hydration status may have also contributed. Incidence of chest infections was also higher at the start of the project and the decrease could be a result of both, improved fluid intakes as well as improved management of the residents with dysphagia. Interestingly, while studies show a high rate of admissions due to dehydration from care home settings, the incidence of dehydration was reported very low. Considering low fluid intakes in this study, it can be suspected that this condition was either underreported by nurses or underdiagnosed by healthcare professionals.

There are some important limitations to consider. Firstly, routine observations of fluids given and consumed were conducted on a small sample of residents, and it could be argued that this may not be a good representative of the population of the unit. However, six residents represent 25% of the population which is relatively high. Additionally, it was noticed that the sample frequently included all three types of residents and therefore most likely represented typical residents on the unit. Small sample means that the mean fluid intakes are sensitive to extreme outliers. A wide standard variation at the beginning of the improvement activity suggests this may have been an issue, but the amount of fluids given should be similar for all types of residents, regardless of their needs, hence it suggests that hydration care was different for some. Also, to account for the extremely low fluid intakes for reasons not possible for care home to control, residents who were at the end of life were excluded from the observations. As discussed above, the data on HLE obtained from nurses' recall was likely to be incorrectly reported and little conclusion can be obtained by analysing this. The incidence of UTI and chest infections was more reliable because the diagnosis was frequently followed by treatment with antibiotics, while hospital admissions were easy to identify by absence of the residents. Other conditions such as constipation and delirium did not have an objective means for

assessment and relied on nurse's judgement and recall, which was not always correct.

In conclusion, the data reported in this chapter demonstrated that interventions made a small impact on residents' fluid consumption and that this change positively affected some healthcare outcomes. These changes were due to an increase in number of opportunities to obtain drinks, larger volumes of the new drinking equipment and possibly residents receiving the drinks of choice. However, the observed trends of fluids given and consumed suggested that the interventions were not fully imbedded in practice and more work is required to sustain them. Additionally, a challenge of monitoring to ensure that the residents consume the fluids they are given, still remains.

Chapter 8 Conclusions and Recommendations

This chapter discusses the findings from the research presented in Chapters 4-7. The results of the research have generated new and important knowledge, which build on the existing evidence on hydration in care home settings, but also have implications in terms of practice and policy as well as conducting research in care homes. Conclusions drawn and recommendations for changes in practice and policy that have emerged will be discussed in the subsequent sections.

8.1 Summary of the findings

The research in this thesis presented a novel and pragmatic approach to provide further evidence that fluid intakes in frail care homes residents are inadequate. Fluid intakes in the current sample have been found to be considerably less than the minimum recommended amount of 1500ml. Furthermore, this thesis provides evidence to challenge the view that residents refuse to drink. In contradiction to the literature that care home residents lack desire or cognitive ability to drink (Begum and Johnson, 2010; Hooper and Bunn, 2014; Hooper, 2016), the findings of this thesis demonstrated that hydration care did not always support the residents to drink adequate amounts. While resident barriers still existed, factors associated with when and how hydration was delivered to the residents had more influence on actual fluid intakes. Little is known about hydration in care homes in the UK, but prior research has demonstrated that residents of care homes were more likely to be admitted to hospital with dehydration, than older people living in the community (see Wolff *et al*, 2015) and the results of the current research summarised and discussed in this section now provide additional knowledge, and recommendations for future practice and policy.

8.1.1 Fluid intakes and opportunities to obtain drinks

Results of the observations (Chapter 5, section 5.3.2) showed that limited opportunities to obtain drinks resulted in a majority of the residents being served fluids in the amounts lower than 1500ml, the minimum recommended fluid intakes. To date there are no studies which aimed to determine how much fluid is served to care home residents, however intervention studies that aimed to increase opportunities to obtain drinks concur with the findings of the current research and have also shown fluid intakes to increase (Spangler *et al*, 1984; Mentes and Culp,

2003). Hence, it is reasonable to assume that the problem of insufficient opportunities to obtain fluids may be present in other care homes. Fluid consumption of the residents was strongly correlated to the amounts they were given, hence limited number of opportunities to obtain drinks may be a primary reason that the residents do not consume enough and become dehydrated. Residents themselves recognised this to be a problem (Chapter 4, section 4.3.3) as they mentioned in the interviews that they did not always obtain the drinks at the times they wanted such as early in the morning or after the meals. This resonates with prior research (see Godfrey *et al*, 2012), which showed that the regimented routine of drinks distribution prevented the residents from obtaining fluids when they wanted them.

In the current research, the residents who stayed in their own rooms were shown to be served less fluids than the residents in communal areas. This is because these residents had less frequent access to staff and therefore had less opportunities to receive and request drinks or refills. For example, during mealtimes the residents who were in their own room would typically see a staff member briefly when a food tray was dropped off or picked up, while there was at least one member of staff throughout the mealtime in the dining room. Providing fluids for a larger group of residents at once was easier than serving individual residents in remote areas, hence opportunities for obtaining drinks were less frequent in the outlying individual rooms.

8.1.2 Residents' drinking experience

While insufficient drinking opportunities largely influenced how much fluid the residents were able to consume, other factors impaired their experience of drinking and further contributed to lower fluid intakes. These factors were first identified in the resident interviews (Chapter 4, section 4.3.3), when the residents discussed their fluid preferences, toileting assistance and drinking vessel design. These findings were confirmed during the observations (Chapter 5), where it was shown that hydration care did not always meet residents' needs and preferences. Interestingly, while about a half of the residents mentioned that they actively restricted their fluid intakes due to fear of incontinence or toileting issues, they were not observed to do so. Furthermore, even during the PDSA cycles in the intervention phase (Chapter 6), where large amounts of preferable fluids were provided, there was no evidence that residents restricted their fluid intakes. Some studies have shown that providing

preferable drinks increased fluid intakes and improved resident hydration status (Spangler et al, 1984; Simmons et al, 2001; Robinson and Rosher, 2002) and the results of the intervention phase, especially the implementation of the Drinks Menu (section 6.4.2) confirm this theory. When given *at libitum* preferable drinks, many residents consumed more fluids. Moreover, the findings in this thesis have showed that the social aspects of drinking are also important. This concurs with prior research that suggests that older people in hospitals and care homes believe that hydration care should focus on enhancing the experience of drinking; they felt that staff put too much emphasis on physiological aspects of drinking such as whether sufficient amounts were consumed (e.g. Godfrey et al, 2012). Instead staff should concentrate on promoting the social aspects of drinking by introducing social gatherings such as tea parties which have been shown to result in improved hydration status and prevention of Hydration Linked Events (see Simmons et al, 2001; Mentes and Culp, 2003). Older people lack the sensation of thirst; hence they have no primary motivation to drink. They also experience reduced mobility; therefore, they assume that drinking less may prevent incontinence or frequent trips to the toilet. This however can be overcome by improving the drinking experience with focus on the type and quality of the drinks served and the social atmosphere. The success of this approach is borne out in the current research through the observation of an enhanced drinking experience in the residents who attended activities in a café and when Drinks Menu facilitated a fluid choice. These findings are supported by those of previous studies, which showed that fluid intakes in free-living older people were usually adequate (Adams, 1988; Kenney and Chiu, 2001; Culp *et al*, 2003, Morgan *et al*, 2003). It has also been shown that free-living older people have more access and greater variability of fluids (Adams, 1988), hence they are more likely to enjoy their experience of drinking. Other factors identified during observations, such as inadequate drinking vessels or unrecognised swallowing difficulties of the residents were likely to contribute to diminished drinking experience and reduced fluid intakes. Interestingly, while previous studies identified that thickened fluids may contribute to low fluid consumption because users find them unpalatable and they do not quench thirst (Mentes, 2006b; Farrell and Petrik, 2009; Godfrey et al, 2012), there was no evidence that this was a contributing factor for lower fluid intakes in this study.

8.1.3 Residents' need for assistance

Results of the observations (Chapter 5) showed that residents can be broadly divided into three categories of independent drinkers, those who need prompting and those who need full assistance. Residents who were independent consumed more fluids, which suggests that appropriate assistance was not provided to those who needed it. A cause for concern revealed by the research in this thesis is that the most vulnerable residents were served very low amount of fluids, usually well below the recommended 1500ml daily target. It was noticed that this group not only received less drinks, but that a high proportion of fluid was derived from fluid rich foods and majority was consumed at mealtimes. Unfortunately, these residents were also often confined to their bedrooms, which made it more likely for them not to receive fluids frequently (Section 8.1.1). Physical and cognitive vulnerabilities have previously been shown to be risk factors for insufficient fluid intakes (Mentes, 2006b), however the studies implied that these residents were difficult to hydrate because they refused fluids or were not able to consume larger amounts. This research has shown that the most vulnerable residents did not consume sufficient amounts because they were often not offered a drink, especially between the mealtimes, early in the morning and late in the evening. However, the results of the intervention phase (Chapter 6), especially PDT (section 6.3.1) have shown that these residents have a desire to drink and are able to consume larger amounts when appropriate assistance is provided. Unfortunately, lack of time and competing tasks that HCAs face throughout the day resulted in these residents not receiving sufficient amounts of drinks because they required considerably more time and effort to consume them. While studies identified that those who need assistance to eat and drink, receive none or very little support (e.g. Simmons et al, 2003), this is the first study that has shown that the amounts of fluids offered to these residents are lower comparing to more independent residents. Furthermore, the results of Chapter 5 demonstrated that staff did not always provide adequate assistance, such as positioning or managing swallowing difficulties, which could have made fluid consumption more difficult for these residents. There seemed to be a lack of awareness between the staff to recognise these as important skills and lack of time could have also contributed. Previous studies identified that staffing resources necessary to provide adequate assistance exceeded the resources available in the care homes (Kayser-Jones et al, 1999; Simmons et al, 2003), although these studies

are relatively old, and it is difficult to assess whether staffing levels in these institutions are still an issue. This study did not attempt to determine whether staffing levels were adequate, but it has shown that there was little time for the HCAs to provide hydration care and that hydration related activities were not scheduled in HCAs routines.

Another reason for lower fluid intakes in the residents who require some level of assistance is that the staff are not always able to recognise the resident needs. It has been observed that the residents deteriorate over time and the need for increased level of assistance may not be immediately noticeable to staff who care for them every day. Furthermore, observations throughout the project have shown that some residents' needs varied from day to day or depended on their location and health state. Hence, it may be difficult for the staff to recognise that some residents may need more help than usual. This could be of a particular problem for the residents who need prompting or those whose level of dependency fluctuates daily. Similar observations were noted in one study where it was shown that residents who required some assistance with obtaining or drinking fluids were more at risk of dehydration than those fully dependent on staff (Mentes and Wang, 2011). Hence it may be that depending on how hydration care is delivered in individual care homes, different residents may be at risk of under-hydration. However, the results in Chapter 5 suggest that while those requiring some level of assistance consume lower amounts, all types of residents are at risk of dehydration because the majority of them are not served sufficient amounts.

8.1.4 Monitoring fluid consumption

The results from focus groups (Chapter 4) indicated that staff were not aware that the hydration care they provided was not adequate. They held the view that residents were difficult to hydrate because they refused drinks or were on fluid restriction. While they also recognised that it was hard for them to maintain appropriate hydration care when they were short-staffed, they did not think hydration care could be improved. Similar findings were obtained in focus groups conducted by Mentes et al (2006a) where staff recognised resident-centred issues such as depression, lack of family support, swallowing difficulties and physical impairments as reasons for the residents not to drink adequate amounts. Neither in focus groups

presented in Chapter 4, nor in the Mentes study, did staff discuss institutional barriers which were not supportive of resident drinking needs.

However, results presented in Chapter 5 demonstrated that ineffective monitoring resulted in staff being unaware of the extent of this problem. Fluid charts were only completed for selected residents who were considered at risk of under-hydration, although it was often not clear how this was assessed. However, according to the observations all residents were at risk of under-hydration as majority did not consume adequate fluids. This would suggest that all residents should have their fluid intakes documented, but due to time constraints, completing fluid charts for all residents would be impractical. Fluid balance charts have long been known to be inaccurate in both acute and long-term settings (Armstrong-Esther et al, 1996; Reid et al, 2004; Mentes, 2006a; Rowat et al, 2011, Godfrey et al, 2012) and there is also evidence that staff do not think they are reliable (Armstrong-Esther et al, 1996). There is also one practical issue in terms of accuracy and that is whether the drink should be recorded on the chart as it is given or only when it is consumed by the resident. The obvious answer should be after consumption, but the person picking up the empty drinking vessels would not be aware when and how much was given. On the other hand, recording the drink before it is consumed shows how much was served, but may not reflect fluid consumption. Considering this, for the documentation to be accurate, staff would need to record the amount served and return to the resident to check whether the entire this drink was consumed. This would add even more workload to the busy schedules of the HCAs. Additionally, fluid charts can only be beneficial if the staff had a reliable system for identifying residents who consistently consume inadequate fluids. This practice was not evident in the care home. However, it is also clear that inaccurate fluid documentation and lack of monitoring prevented staff to recognise how little fluids were actually consumed by the residents.

Another problem observed was that hydration was not an allocated task but was considered a team activity. As the popular saying goes ‘everybody’s job is nobody’s responsibility’, lack of allocations resulted in drinks not being served as frequently as they should be. This diffusion of responsibility meant that staff were under an impression that even if it was not them personally, someone must have offered the drink to the resident, providing the ‘ongoing’ hydration care that they thought existed

in their care home. The evidence for this assumption were the fluid charts, which were completed by one person at the end of the shift. Staff assumed that drinks would have been given and consumed at all drinking opportunities and recorded the drinks in accordance with the schedule rather than recording what was actually given. Fluid charts have become another tick list exercise that had to be completed at the end of the shift and prevented staff from recognising how little fluids they served to the residents. While the role of allocations in relation to hydration care has not been identified in literature so far, there are many research studies which suggest that lack of responsibility was an underlying problem for many failures in healthcare (Higham, 2011; Nordgren 2013; Wangmo et al, 2017).

Furthermore, there was no evidence that fluid charts were reviewed in order to assess residents' drinking habits. This should be an important part of fluid monitoring because this would be the only way to assess resident fluids over time and identifying residents at risk of under-hydration. Without this essential task, fluid charts became just a formality, which may be the reason why staff did not make an effort to complete them accurately.

While fluid monitoring is important, it was felt that it was not a primary aim of this study. Due to time constraints it was decided that the entire focus should be enabling the HCAs to provide hydration care and enhancing resident drinking experience. However, this issue remains unresolved and novel strategies are required to address this.

8.1.5 Hydration not seen as a priority

The findings of this study suggest that Care home staff have a lot of responsibilities and hydration care competes with other tasks. To ensure good hydration, fluids need to be provided frequently, more often than food (Kayser-Jones et al, 1999). Since there is no allocated time for this, hydration care is presumed to occur while other aspects of care are provided. Staff are given jobs that they need to complete by certain times, which lead to a task-focused culture. For example, it was observed that staff aimed to wash all residents and get them out of beds before noon, therefore they rushed through all the tasks in the morning, so they could get the residents ready by lunch time. Similarly, they aimed to change all residents' incontinence pads by dinner and have everyone in beds by the end of the shift.

Hydration care does not fit into this culture because it is not set as a task and needs to be repeated many times throughout the day. As a result, hydration care is often forgotten and neglected. When providing personal care, staff may notice unfinished drinks on residents' tables and falsely believe that drinks are not required, but since there is no effective monitoring, they do not realise that this drink could have been there for a long time. Adding to this, may be the stigma of incontinence projected on staff, residents and visitors by the society (Ostaszkiewicz *et al,* 2016), which implies washing and changing incontinence pads should take a priority. Staff have been observed to prioritise these takes instead of serving drinks. This was particularly visible during and post PDSA cycles when staff often wanted to shorten Protected Drinks Times, so that they could start doing the pad rounds earlier. This demonstrates how personal care is perceived as more important in care homes and highlights the task-oriented culture of completing the job that staff thought was expected from them. This task-oriented culture has been described and criticised previously (Brownie and Nancarrow, 2013), and the findings of this thesis show that this approach may contribute to residents' low fluid intakes and increase the risk of underhydration.

Traditional view of task-oriented care is that all physiological needs are met, but the psychosocial needs are less important and may remain unsatisfied (McGreevey, 2016). On the other hand, person-centred care is considered to address psychosocial needs, but there is some concern that physiological needs are not always met (Brownie and Nancarrow, 2013). It could be argued that for the sample in the current research, hydration, despite being a fundamental need to sustain life was perceived as neither physiological nor a psychosocial need. As opposed to washing and incontinence care, hydration was an 'invisible' task, where failure to provide it went unnoticed. Additionally, since this part of care was not allocated, even when this failure was discovered, there was no staff member who could be held accountable. This diffusion of responsibility was not evident with personal care. Lack of time was often mentioned as a reason for not providing fluids, but at the end of the shift, staff were observed to enjoy their earned 'free time', and drinks were still not provided. Previous studies reported that when all tasks are completed, staff take this as a sign that their shift has ended and feel no responsibility towards the residents (Chuang and Abbey, 2009). The findings in this thesis demonstrated that not only the

staff in this care home displayed similar attitudes towards their work, but also, they did not perceive hydration as part of the tasks they had to complete.

While it would be easy to blame clinical staff for providing inadequate hydration, there were other factors that initiated the oversight of this essential part of resident care in favour of other tasks. For example, insufficient equipment and drink supplies prevented the staff to deliver fluids effectively, but also reinforced the message that the home managers and team leaders did not perceive this as an important part of care provision.

8.1.6 Improving hydration care

Some experts believe that achieving recommended fluid intakes in older people is not possible (Ferry *et al*, 2005; Hooper and Bunn, 2014; Hooper, 2016) and this attitude was observed amongst the staff in this study (Chapter 4). This is because staff were not aware of institutional factors that underpinned low fluid consumption. This finding resonates with prior research as similar beliefs were expressed by care home staff in a study by Mentes *et al* (2006a) and suggests that current practice warrants reform.

Importantly, the results of the intervention phase of this thesis (Chapter 6) revealed that increasing fluid intakes in residents is possible. Strategies such as providing preferable drinks, increasing opportunities to obtain drinks and/or increasing volumes, providing assistance or equipment that facilitates independence helped to increase resident fluid consumption. Whilst many of these strategies are not new, they have been reported in other studies and have been shown to be effective (Spangler et al, 1984; Simmons et al, 2001; Robinson and Rosher, 2002; Mentes and Culp, 2003). One interesting observation from the current research was that while fluid intakes increased, the resident ability and willingness to drink did not seem to plateau and there was still no evidence of residents refusing drinks. This observation provides evidence that institutional factors and how care is provided are the major reason for residents' low fluid intake and also the key to how they can be improved with the types of simple interventions described in this thesis. More importantly, the findings of this thesis show that whilst there may be some residents who would refuse to drink, this type of resident is less prevalent than previously thought.

However, it should be acknowledged the complexity of barriers accompanying hydration care make these interventions difficult to maintain. Lack of leadership and accountability, inadequate skills and knowledge, and inconsistent support from senior management were identified as the reasons the interventions were not fully adopted in practice. Results of the intervention phase (Chapter 6) demonstrated an importance of managerial support and leadership in sustaining effective hydration care. For example, presence of senior managers at the meetings or huddle training helped to overcome initial resistance towards change exhibited by some staff. On the other hand, this support was not consistent throughout the project, which resulted in some interventions not being sustained. This can be exemplified by reluctance of administrative staff to be involved in updating Refreshment Needs Guides (section 6.4.3) or the unwillingness of the kitchen manager to supply sufficient amounts of fruit juices (section 6.4.2), which subsequently affected the success of these interventions. Senior managers are in position to positively or negatively influence quality of care by establishing systems to operate and prioritise tasks as well as reinforce leadership at operational level. Hence, this thesis asserts that improving care in nursing homes requires a top-down approach. Alternatively, improvement activity could come from less senior staff who must seek approval and consistent support from their employer. This approach is in line with the findings of previous research, which recognised that senior managers have a responsibility to support the improvement activities, so that all staff see the change as important and in line with organisational priorities (Cloutier *et al*, 2006). Hence, as shown in the findings of this thesis, if senior managers do not see hydration as a priority, the improvement activities are not likely to be successful or sustained.

Realistically it should be acknowledged that it may be difficult to encourage senior managers in care homes to initiate and fully support the improvements suggested in this programme of research. Care homes strive to provide complex care and frequently do so with a small budget and limited resources, while trying to overcome challenges of rapid staff turnover (Donohue, 2010; Cammer *et al*, 2014). Although preventing dehydration and its potential outcomes can provide cost benefit to NHS, there appear to be few or no incentives for care homes to improve care and this is unlikely to change unless they are given motivation for doing so. This is an issue for

policy makers who should provide the incentives for the care homes to continuously improve the quality of care that provide.

8.2 Impact of the findings on current knowledge in the field

An important element resulting from the interventions outlined in this thesis is the provision of an estimate of fluid intakes of the care home residents. Majority of the studies reporting this are old and many were conducted in in the USA (Gaspar, 1988; Adams, 1988; Armstrong-Esther et al 1996; Kayser-Jones et al, 1999). One recent paper in the UK reported the daily fluid intakes of the residents (Jimoh et al, 2015), although this focused on the assessment of self-reported drinks diaries which by necessity implied participants were able to drink and record their fluid intakes independently and therefore did not represent the typical care home residents such as those who have taken part in the current study. Furthermore, the current research did not rely on staff or the existing records to estimate fluid intakes but derived this from independent direct observation of the residents throughout the day by the researcher and her colleagues. This is also the first study that reports on the amount of fluid served to the residents, which provides support for the notion that hydration care in these institutions is not adequate. Hence this study is in contradiction to the current opinion favouring the hypothesis that the principal underlying reason for dehydration in this population is lack of motivation to drink from the participants themselves (see Ferry *et al*, 2005; Hooper and Bunn, 2014; Hooper, 2016). The results of the current research clearly show that institutional factors, such as the type of drinks and equipment offered, staff skills, knowledge and workload and the daily routines in the care home influence fluid consumption of the residents. Prior to the findings of this thesis, little has been known about institutional factors, although a series of research by Kayser-Jones team highlighted some problems in the care homes in the USA (Kayser-Jones et al, 1999; 2002; 2003 and 2009). More importantly, results of the intervention phase (Chapter 6) provide evidence that by improving these factors, residents' fluid intake does increase thus detracting from the notion that if resident motivation to drink alone was the principal influence on the amounts they consumed, this change would not have been achieved.

The current research also provides evidence that hydration care is a complex issue that is influenced by a number of factors, some of which are beyond the control of

care home staff. While it can be said that residents are affected by the quality of care they receive on the unit, this care is largely influenced by other factors that represent the general culture of the care home and the approach of senior managers towards hydration care. However, these are a result of the general attitudes of policy makers, influence of society and financial constraints of the care home sector. The consideration of the findings of the current research raises important implications for practice and changes in policies.

8.3 Implications for practice

It is widely recognised that hydration has been overlooked by health professionals, policy makers and researchers in favour of nutrition (Simmons and Schnelle, 2003; Water UK, 2005; RCN and NPSA, 2007; Lecko, 2008; Mentes and Wang, 2011; Godfrey *et al*, 2012; Lecko, 2013). The findings that have been obtained throughout this thesis, strongly identify a need for care homes to change their approach towards hydration care.

Hydration care for older people is complex and requires more than presence of water jugs on resident tables. Many residents come into a home with some level of disability and they rely on staff to provide hydration care. Due to a range of different disabilities, residents have different needs and preferences, which staff need to meet. To further complicate this, the needs may not always be obvious to the staff and may also fluctuate. Hence it is difficult for care homes to provide a one-for-all model of hydration care to meet all requirements. However, the first step is for the care homes to recognise that the hydration care they currently provide may be inadequate. The results of this research demonstrate that previous staff beliefs that residents do not want to drink (Mentes *et al*, 2006a, also confirmed in Chapter 4), need to be changed. It is a care home managers' responsibility to acknowledge that change is necessary and consider hydration as a priority. Managers are in a unique position to influence this change in their homes.

In light of the evident challenges to monitoring of fluid intakes, care homes must ensure they provide sufficient opportunities for all residents to obtain fluids. Systems must be introduced with the aim to reliably provide fluids in excess of 2000ml to allow for the fact that some fluids may not be entirely consumed. To ensure this happens, fluid provision must be allocated to individual staff members, who would be

accountable for their actions. Adequate fluid provision can be achieved by providing two drinks at most of the opportunities and supplementing with fluid rich foods. Results of PDT (section 6.3.1) demonstrated that hydration care can be more efficient than currently provided, and the task of providing additional opportunities can be attached to existing responsibilities (section 6.3.2). Since all residents are at risk of insufficient fluid intakes, this part of their care needs to be provided to everyone. Additional opportunities to obtain fluids were identified throughout observations but were not tested in the intervention phase. These can include providing drinks with and after meals and extending opportunities to obtain fluid rich foods between meals. A structured drinks round early morning and late evening for the residents who are awake could also be beneficial. While these tasks may seem routinized and in contradiction to the principles of person-centred care, in the absence of an appropriate and consistent fluid monitoring system, this is the only way to ensure that all residents are given sufficient amounts of fluid throughout the day. Since the results of the observations also identified that those who stayed in communal areas received more drinks (section 5.3.3), it may be beneficial to encourage the residents to come out of their rooms whenever possible.

Once systems in place are sufficient, hydration care can be further improved by focusing on personalised care. Some residents require help in form of prompting or assistance, which needs to be provided consistently. Observations identified that the most vulnerable residents who need full assistance to receive fluids are also at risk of receiving the least amounts. Hence systems need to ensure that not only are fluids provided, but that these residents are given appropriate care at each opportunity to ensure that they have an opportunity to consume the drinks offered. Residents who require prompting should be supervised frequently to ensure they are reminded to drink. To ensure appropriate assistance is given, information about each resident needs to be efficiently disseminated amongst the staff. This can be achieved by Refreshment Needs Guides (section 6.4.3), which can help staff to identify, communicate and easily access vital information about the residents, although the logistics of creating and updating these guides may prove a challenge, An alternative could be provided by introduction of one of the electronic systems, which are becoming increasingly popular in care home settings.

Providing preferable drinks can enhance drinking experience and therefore increase residents' fluid intakes. Preference compliance can be achieved by providing a communication tool such as a Drink Menu. The menu provides the means to enhance communication between staff and residents in both directions: for staff to show the residents which drinks are available and for the residents to indicate which drinks they would like to obtain. Although the Drinks Menu concept has not been entirely adopted by staff (section 6.4.2), its potential has been demonstrated when a wider selection of drinks was chosen by the residents. Results of dissemination to unit A (section 6.6), also provide evidence that a Drinks Menu in combination with PDT increases fluid intakes. Care homes may also need to extend a range of drink options to better accommodate for residents' preferences (section 6.4.1).

Experience of drinking can be further enhanced by providing adequate drinking vessels. Interviews with residents highlighted that current drinking equipment does not meet the needs of the residents (section 4.3.3.). Optimising the design of drinking vessels to better suit the needs and preferences of the residents is easy and practical and increases fluid intakes without influence on staff workload (section 6.5.2). As opposed to the introduction of assistive devices, this strategy does not compromise the dignity of individuals.

Results of the observations identified that residents received and consumed insufficient fluids because of inadequate systems in monitoring. While this was out of scope for this thesis, monitoring remains an important part of providing hydration care and is a requirement imposed by CQC (2010). Although CQC requires that only residents at risk are to be monitored for fluid consumption, the results of this thesis suggest that this essentially includes all residents. This poses a significant problem for care homes as adequate documentation would require staff to record hydration care immediately, but this is not always possible. Electronic systems for documentation provide the means for recording fluid intakes for all residents, but the data captured parallels with fluids given rather than consumed. No recommendations regarding effective monitoring can be given at this time, but if adequate systems for providing all residents with sufficient amounts of fluid are established, the residents who do not consume entire drinks can be flagged up as potentially being at risk.

Considering financial pressures experienced by care homes, senior managers may feel reluctant to introduce some of the changes proposed in this study. A potential benefit could be adoption of Lean methodology, which uses an approach to reduce waste (Ackerman and Cowan, 2011). Lean defines waste broadly as any process that does not add value to the end product, hence by eliminating waste, one can reduce cost and time of production while increasing quality (Hines *et al*, 2004). Lean adopted and developed a set of tools by which theory could be put into practice (Tyagi *et al*, 2015). Although the effectiveness of Lean methodology has not been evaluated in a care home setting, there is sufficient evidence of its application in other healthcare settings (Liberatore, 2013). Potential opportunities to reduce waste by applying Lean methodology have been identified throughout the study. The examples of the 'waste' that could be reduced include the need for HCAs to hand wash drinking equipment, frequent visits to the kitchen and providing desserts that may not meet residents' preferences. Further examination of processes can help identify how staff time may be optimised, so other staff groups can contribute towards providing hydration care.

It is also important to mention that during implementation; care homes may experience contextual issues that require local adaptations of the proposed interventions. This was evidenced during dissemination to unit A, when it was noticed that less staff were available for PDT and that the activity had to be scheduled earlier (section 6.6).

This thesis also highlighted some implications regarding person centred care. The term itself implies that residents are receiving bespoke care that is given based on individuals' unique circumstances and characteristics. However, it can be argued that some elements of tested and implemented strategies may be seen as being in contradiction to this philosophy. Providing sufficient opportunities for obtaining fluids is an example that a unit wide approach, which targets all residents at the same time would be a more feasible, especially considering the identified problems with monitoring and that residents do not or are not able to request drinks. It is possible that person-centred care is seen subjectively by all stakeholders, but it can be hypothesised that certain parts of care in this setting must be routinized to ensure residents' wellbeing. Only when certain standards are satisfied, person centred care can positively affect the residents. This finding may explain why some care homes

struggle to implement this model of care (Rosemond *et al*, 2012). Hence care homes must first strive to provide a good standard of care for all residents and move to person-centred care to improve the quality once this is achieved. To do so, parts of routinized care must be clearly signposted and embedded into everyday practice.

8.4 Implications for change of policies

Systematic review on improvement science in care home settings has shown that implementing change is difficult (Szczepura *et al*, 2008). Authors reported that neither providing performance feedback nor training the staff in relevant methodology resulted in improved care. When improvement was achieved, it was often not sustained. Authors concluded that the success in care homes largely depended on the organisational culture that supported change. This resonates with the findings of this study, which found that support from senior management was essential and also discussed reasons why motivating care homes to make a change is difficult. Compliance with evidence-based guidelines has also been found to be poor (Szczepura *et al*, 2008). However, it must be acknowledged that the guidelines are rarely specific to care homes, hence it is difficult to determine whether they have any application in this setting (BGS, 2011). The only guidance provided is a set of standards set by CQC, by which care homes are assessed. However, the guidance does not offer advice on how to achieve these standards. This gives a lot of freedom for care home managers to decide how care is delivered, but there is a risk that processes and tools they choose may not be appropriate. Furthermore, anecdotal evidence provided by care home managers also suggests that assessment by CQC inspectors is subjective and advice given is not consistent and sometimes not practical. Hence there is a need for development of care home specific guidelines, which can demonstrate the best practice. These could include evidence on tools and interventions proven to be effective in this setting. These guidelines should ideally be acknowledged by CQC, which could also use them for assessment. There is a possibility that insufficient evidence exists for providing care on some aspects of care, but additional advantage may be that guidelines will recognise existing knowledge gaps and therefore will help to identify research priorities.

There is a need for the external healthcare professionals to support care homes. The need for the involvement was highlighted in the observations in the exploratory

phase, where it was shown that support from SALT and dieticians to guide the staff to appropriately position the residents and manage swallowing difficulties was required. Current evidence demonstrates that disabled and chronically ill residents require an increasingly complex type of care, hence there is a need for more specialist input. Limited access to external healthcare professionals suggests that care homes are expected to employ the staff who possess the skills and knowledge necessary to provide this specialist care. However, the majority of resident care is provided by the least educated HCAs, who are frequently left unsupervised and are burdened with overwhelming workloads (Mentes and Tripp-Reimer, 2002). Registered nurses also frequently lack the skills and knowledge to care for older people and need more specialist training (Spilsbury *et al*, 2015). Care homes are already struggling financially and expecting them to employ other healthcare professionals is unreasonable. Hence there is a need for NHS and governing bodies to recognise this problem and commission appropriate support of healthcare professionals without incurring financial investment for care homes. Establishing meaningful relationships with care homes has a potential cost benefit for the NHS through prevention of avoidable treatments and hospital admissions.

This thesis also identified that the attitude change in care homes is essential. To achieve this, care homes need to be more open and be prepared to participate in research and improvement projects. Considering the inconsistent commitment and support of senior managers demonstrated in this research, there is a need to initiate these activities beyond the influence of care homes. Imposing penalties for inappropriate care can be one way to achieve this, but many care homes are already struggling, and this could unnecessarily put them in crisis. Evidence from the acute sector demonstrates that setting the targets and penalties for not meeting them, results in negative outcomes (Gubb, 2009). Instead, governing bodies could provide incentives for care homes that participate in research and improvement initiatives. An evaluation of one such scheme in the USA showed the benefit of participation (Rehkamp *et al*, 2016). There were some positive outcomes for care homes, which included reduced staff turnover rates, recognition within the industry and opportunities for free marketing. However, to be able to participate in improvement activity, care homes had to invest their financial and other resources with no guarantee to receive compensation, this could potentially prevent some homes from

joining such schemes. It was also apparent that while the overall cost benefit was evident, care homes not only did not gain, but sometimes also lost their revenues (Rehkamp *et al*, 2016). Hence there is a need to design the programmes that will ensure guaranteed incentives for participation. Additionally, managers may feel reluctant to be involved in research. This may be because they fear to attract the type of negative publicity, that is frequently overemphasised in the media (Tellis-Nayak, 2007), are distrustful of research activity (Mentes and Tripp-Reimer, 2002) and want to avoid unnecessary disruption to care patterns (Wild and Kydd, 2016). These potential barriers can be overcome with raising awareness of the importance of research in this setting and providing sufficient incentives to participate, which shows that research can be mutually beneficial.

8.5 Implications for research in care homes

The Care home environment is challenging for researchers to navigate. Access to care homes as described in the previous section is only one of the barriers, which can also include inadequate staffing and high staff turnover, rigid care schedules, staff not complying with research protocols and problems with recruiting participants (Mentes and Tripp-Reimer, 2002; Hall *et al*, 2009; Kaasalainen *et al*, 2010). For these reasons, care homes are frequently ignored and excluded from research activities. Those who conducted research in care homes report that this activity requires considerable investment of time and resources (Mentes and Tripp-Reimer, 2002; Kayser-Jones, 2003; Munroe *et al*, 2011).

This thesis confirmed these findings. Staff turnover was a particular challenge and impacted on the sustainability of the implemented interventions. Rigid routines, especially concerning personal care were frequently used as an explanation for not complying with the procedures set out for interventions. Additionally, lack of adherence to allocations impacted on the conduct of some PDSA cycles. This can be perceived as a resistance from staff, and a lack of adequate leadership suggests poor buy-in into the project by all staff groups including Senior Management. In general, staff attitudes throughout the project were that they could contribute when they had time and resources to do so.

The research process from early observations to the end of the project was time consuming and required research staff to visit frequently. During the implementation

phase, care home relied on researchers to plan the interventions, remind and lead the staff, as well as collect and analyse the data. It was not possible to carry out any PDSA activity without involvement of research staff. This may be because staff did not see improvement work as essential or possibly because they lacked the confidence to carry it out by themselves. The latter is possible because lack of staff knowledge and skills to carry out improvement activities was evident. This could be expected from HCAs, but it was observed in all staff groups. Of particular issue were PDSA cycles, where staff found it difficult to understand why they were expected to go back to an old routine after the testing. They felt that this practice sent mixed messages to the staff in terms of what they were required to do. In addition to being time consuming, the need to oversee the appropriate conduct of interventions also posed a problem because the researcher had no authority to command staff to carry out the activities, but at the same time was required to take charge.

Despite some barriers, PDSA cycles were found to be an effective methodology for implementing changes. Testing on a small scale enabled identification of the barriers to the conduct of some interventions. This resulted in a small investment of time and resources and helped to identify a number of contextual issues which affected practicality of the interventions. However, it was sometimes noted that some staff did not provide reliable feedback for the PDSA cycles. This resulted in interventions being escalated or implemented only to identify a number of contextual issues, which prevented staff from conducting the interventions as intended. It was not possible to identify reasons for this behaviour, but it is likely that it could be a result of social desirability bias (Holbrook *et al*, 2003). Another possibility is that staff simply found it easier to report no problems, so they did not waste their time providing lengthy feedback to the researcher.

To further facilitate improvement in care homes, staff need to be encouraged to claim the ownership of the project and be responsible for its management and legacy. One of the reasons this project was only partly successful, was due to staff being too reliant on the research team to plan, execute and assess the activities. Lack of knowledge or confidence in using improvement science methodology could be an underlying reason for this happening, but staff at all levels were also not keen to learn this. To enable a smooth execution of improvement activities on the unit, a team consisting of researchers, clinical services manager, two HCAs and one nurse

was established at the start of the project. The plan was for the team to meet once weekly to discuss activities and plan for interventions. Unfortunately, due to lack of time, clinical staff were not always able to attend the meeting. Additionally, internal and external staff turnover prevented formation of a stable project team, which potentially hindered staff ability to take this responsibility. This most likely resulted in staff feeling that the interventions were imposed on them, rather than co-designed with them. Ideally, this project should have been conducted with the research team providing expertise and support, with care homes staff being able to plan, execute and collect their own data. The benefit of doing this would equip the staff with invaluable skills and enable the care home to carry out improvement projects independently with no or little input from external sources.

8.6 Limitations of the research

Limitations for each study have previously been discussed at the end of each chapter. This section provides an overview of the limitations regarding this whole project and their implications to this thesis.

Setting may be considered the greatest limitation of this study. The work was conducted in one large nursing home in London. It is possible that this could have affected the results obtained. For example, care homes in other areas of the country may not be affected by the high staff turnover rate, which influenced the outcomes of the intervention phase. On the other hand, effective middle and senior leadership would have prevented this from occurring. In fact, leadership itself is sometimes a reason for high staff turnover. Additionally, residents of the nursing homes represent the most dependable and hence the most challenging population. It is possible that some barriers may not have been encountered in residential homes. While there is no evidence which suggests that large care homes deliver a different quality of care than smaller ones, there is a possibility that large homes belong to a bigger chain which may provide different care. However, one systematic review found no relationship between the type of ownership and quality of care (Comondore *et al*, 2009), although this review also identified that besides ownership, there were other factors that could influence the quality of care that individual homes provided. Again, it could be argued that effective leadership would have been more important.

The small, stratified sample of the individual observations could have had an effect on the results obtained before and after the improvement activity. Similarly, it could be said about the randomised sample of the residents observed routinely throughout the project. Larger samples decrease a level of uncertainty and provide greater power to detect differences. However, due to the nature of this project, obtaining data from larger samples was not feasible. Routine data collected throughout the project identified similar trends as those observed from the stratified sample, which provides evidence that sample size did affect the results obtained. While it could be argued that the small sample was a problem, aggregating this data provided a much more reliable sample size. Additionally, it can be argued that small sample size should not be an issue in this case at all, because fluids served should have been similar to all types of residents and little disparity should have been found. It should also be highlighted that six residents randomly selected each month represented 25% of the population of the entire unit.

Setting up more process measures, especially those associated with implemented interventions could have been beneficial. At the moment it can be speculated that inadequate fluid intakes were due to interventions not being fully implemented into practice. Process measures could have helped identify which interventions were not sustained and why, and could possibly allow the team to act on this knowledge. Due to time constraints setting up more process measures would not have been feasible. This issue was partly resolved by data from routine observations, which identified that some interventions were not conducted as intended. Balance measures would have also been beneficial, especially considering the potential risk of over-hydration. Anecdotal evidence provided by nurses suggested that this was not a problem and throughout the project there were no residents who were diagnosed to be overhydrated.

The most reliable method of assessing the effect of the interventions would have been the direct assessment of hydration status. This posed some difficulties, since the only reliable method of assessment is blood osmolality, which is not routinely available in care home settings and would not have been ethical to obtain. Additionally, many residents who were present at the beginning of the project were not there at the end, hence the direct before-after measurement of hydration status would not have been possible. It could be argued that fluid intakes may not reflect

hydration status, however, in the light of the evidence that hydration care was influenced by institutional factors, the increase in the amount of fluids served and consumed would have been more appropriate as it reflects the improvement in the quality of care rather than physiological state of the residents that could have been influenced by other factors. Since fluid intakes can fluctuate on a daily basis, monitoring these over time was more reliable than using a before-after comparison.

Another limitation can be associated with data collected on HLE. There were little conclusions that could be drawn because many of these outcomes are not entirely associated with fluid intakes and for some, a firm link has not been established. Challenges linking diseases to fluid consumption have been described in section 2.4.8. Data was collected retrospectively, which made it sensitive to recall bias, while the subjective identification of some conditions possibly coupled with nurses' desire to avoid negative reporting predisposed this data to reporting bias. Sample size could also be mentioned as a potential limitation as a small number of residents on one unit was not likely to show any significant changes.

Results of the focus group with staff demonstrated that staff maintain an idealised view of how hydration care is provided or are reluctant to share any negative views they hold. Social desirability bias is often mentioned in research from varying disciplines (Holbrook *et al*, 2003). This could have potentially affected some of the results, especially the feedback from the interventions and could influence the decision making when planning the implementation activities. This could have been a reason why some interventions were not successful.

Finally, researcher positionality must be considered as a potential limitation. Traditionally this concerns qualitative research more than quantitative, although both are possibly affected. Previous knowledge, experience and attitudes can shape the researchers' decision on research conduct, data analysis and drawing final conclusions. This was minimised by creating data tools to capture data subjectively, collecting quantitative data to support the findings and cross-validating results with other researchers involved in this project.

8.7 Future research

There are several potential directions that can be undertaken following the results of this thesis. These concern new research, quality improvement and innovations that could benefit the residents. The rationale for these is provided below.

Given the limitations of the setting in which this project was conducted, future research needs to focus on assessing hydration in a wider context. Similar observations are required to be conducted in residential homes where individuals are less dependent so as to determine fluid intakes in this setting. Different barriers are expected to affect the residents with dementia and it is likely that resident factors have more influence on fluid intakes, but observations could further identify institutional barriers that prevent them from drinking. It can also be suspected that hydration care in a hospital setting may be similar and this warrants further investigation.

Reliable monitoring of fluid intakes remains a challenge, especially since it has been identified that all residents are at risk of consuming inadequate amounts. A new electronic data record system may provide a feasible solution to this problem, but needs the focus of a separate study, preferably with an involvement of software engineers or other experts in this field. Barriers to overcome would include encouraging staff to input the data immediately after drink provision and differentiating between fluids served and fluids consumed.

This thesis identified that providing an appropriate cup or mug may have a potential in increasing fluid intakes in the residents. This is a new strategy that has not been researched previously and little data exists to support its effectiveness. Hence there is a need to further investigate this approach. More research needs to be done to test different designs of drinking vessels suitable for this population. There is also a need to design an appropriate vessel and introduce it into the market to ensure its steady supply. This also warrants an intervention study to compare fluid intakes of the residents drinking from standard and specially designed equipment. Further qualitative interviews with this population group could also shed insights into barriers associated with drinking equipment and assistive devices.

The introduction of a Drink menu highlighted the importance of preference compliance and its potential in increasing fluid intakes of care home residents. This

clearly indicates that lack of thirst can be compensated by providing preferred fluids. Studies before the current research did not investigate the availability of preferable drinks or a wider range of fluids on the perception of thirst in older people. This could also be evaluated in conjunction with visual cues that might encourage people to drink e.g. pictures of the drinks or other people drinking.

Finally, this thesis identified some barriers and facilitators to conducting improvement projects in care homes, but this was not the main focus. Improvement work in this setting is a relatively new topic and little is known about the methodology that could be used to support change. Hence there is a need for future research to identify appropriate methodologies and describe barriers and facilitators for improving care in this setting.

8.8 Conclusions

The research reported in this thesis furthers the knowledge of the complexity of hydration for care home residents. Most residents do not consume adequate amounts of fluids due to the insufficient fluids given to them and those who need assistance and stay in their rooms are given even smaller amounts. There are a number of barriers that hinder staff ability to serve fluids, including insufficient staff knowledge, lack of allocations to hydration care, inadequate monitoring and focus on giving personal care instead. These findings demonstrate that hydration is not given enough attention in the care home setting. Residents also experience additional barriers that affect their enjoyment and ability to drink, such as not being provided with preferable drinks, not receiving assistance they need and not being able to handle the drinking equipment provided to them. Increasing fluid intakes in this population is possible if adequate number of opportunities to obtain drinks are established and the residents are provided with adequate assistance and preferable fluids. Care homes need to implement suitable strategies to overcome the barriers in order to provide a good quality of hydration care. Doing so requires organisational commitment with consistent support from senior managers and strong leadership at operational level.

References

Ackerman, J.D., Hemphill, R. & Cowan, D. (2011) Lean Is a Tool in the Toolbox, Not the Silver Bullet. *Annals of Emergency Medicine,* 58(4), p.398-399.

Acocella, I. (2012) The focus groups in social research: advantages and disadvantages. *Quality & Quantity,* 46(4), p.1125-1136.

Adams, F. (1988) How much do elders drink? *Geriatric Nursing,* 9(4), p.218-221.

Adatto, K., Doebele, K.G., Galland, L. & Granowetter, L. (1979) Behavioral factors and urinary tract infection. *The Journal of American Medical Association,* 241(23), p.2525-2526.

Akimoto, T., Ito, C., Kato, M., Ogura, M., Muto, S. & Kusano, E. (2011) Reduced hydration status characterized by disproportionate elevation of blood urea nitrogen to serum creatinine among the patients with cerebral infarction. *Medical Hypotheses,* 77(4), p.601-604.

Altieri, A., La Vecchia, C. & Negri, E. (2003) Fluid intake and risk of bladder and other cancers. *European Journal of Clinical Nutrition,* 57(S2), p.S59-S68.

Alzheimer's Society, Royal College of Nursing (2010) *This is me.*

Anglian Water (2009) *Heath on Tap – A Campaign to Promote Good Hydration in Older People in Residential Care from Anglian Water.* Available at: http://www.anglianwater.co.uk/_assets/media/health-on-tap-good-hydration-report.pdf [Accessed: 29 October 2016].

Anonymous. Florida initiative aims to slash unnecessary admissions due to 'catch-all' dehydration diagnosis. (2001) *Clinical Resource Management,* 2(5), p.77.

Arinzon, Z., Feldman, J., Peisakh, A., Zuta, A. & Berner, Y. (2005) Water and sodium disturbances predict prognosis of acute disease in long term cared frail elderly. *Archives of Gerontology and Geriatrics,* 40(3), p.317-326.

Armstrong, L., Maresh, C., Castellani, J., Bergeron, M., Kenefick, R., LaGasse, K. & Riebe, D. (1994) *Urinary indices of hydration status.*

Armstrong, L.E. (2005) Hydration Assessment Techniques. *Nutrition Reviews,* 63(Supplement 1), p.40-54.

Armstrong, L.E. (2007) Assessing hydration status: The elusive gold standard. *Journal of the American College of Nutrition,* 26(5 Suppl), p.575S-584S.

Armstrong, L.E. (2012) Challenges of linking chronic dehydration and fluid consumption to health outcomes. *Nutrition Reviews,* 70(11), p.S121-S127.

Armstrong, L.E., Ganio, M.S., Casa, D.J., Lee, E.C., McDermott, B.P., Klau, J.F., Jimenez, L., Le Bellego, L., Chevillotte, E. & Lieberman, H.R. (2012) Mild dehydration affects mood in healthy young women. *The Journal of Nutrition,* 142(2), p.382-388.

Armstrong, L.E., Maughan, R.J., Senay, L.C. & Shirreffs, S.M. (2013) Limitations to the use of plasma osmolality as a hydration biomarker. *American Journal of Clinical Nutrition,* 98(2), p.503-504.

Armstrong, L.E., Soto, J.A., Hacker, J.,F T., Casa, D.J., Kavouras, S.A. & Maresh, C.M. (1998) Urinary indices during dehydration, exercise, and rehydration. *International Journal of Sport Nutrition,* 8(4), p.345.

Armstrong-Esther, C.A., Armstrong-Esther, D.C., Browne, K.D. & Sander, L. (1996) The institutionalized elderly: dry to the bone. *International Journal of Nursing Studies,* 33(6), p.619-628.

Armstrong-Esther, C.A., Brown, K.D. & McAfee, J.G. (1994) Elderly patients: still clean and sitting quietly. *Journal of Advanced Nursing,* 19(2), p.264-271.

Asplund, R. & Aberg, H. (1991) Diurnal variation in the levels of antidiuretic hormone in the elderly. *Journal of Internal Medicine,* 229(2), p.131.

Asplund, R. & Aberg, H. (1992) Health of the elderly with regard to sleep and nocturnal micturition. *Scandinavian Journal of Primary Health Care,* 10(2), p.98.

Asplund, R. (2004) Nocturia, nocturnal polyuria, and sleep quality in the elderly. *Journal of Psychosomatic Research,* 56(5), p.517-525.

Badr, K.F. & Ichikawa, I. (1988) Prerenal failure: a deleterious shift from renal compensation to decompensation. *The New England Journal of Medicine,* 319(10), p.623.

Barbour, R.S. & Kitzinger, J. (1999) *Developing focus group research: politics, theory and practice.* London: SAGE.

Barbour, R.S. (2005) Making sense of focus groups. *Medical Education,* 39(7), p.742-750.

Barchel D, Almoznino-Sarafian D, Shteinshnaider M, Tzur I, Cohen N & Gorelik O (2013) Clinical characteristics and prognostic significance of serum albumin changes in an internal medicine ward. *European Journal of Internal Medicine,* 24(8), p.772-778.

Basile, D., Anderson, M. & Sutton, T. (2012) Pathophysiology of Acute Kidney Injury. *Comprehensive Physiology,* 2(2), p.1303-1353.

Beck, A.M., Ovesen, L. & Schroll, M. (2002) Home-made oral supplement as nutritional support of old nursing home residents, who are undernourished or at risk of undernutrition based on the MNA. A pilot trial. Mini Nutritional Assessment. *Aging Clin Exp Res,* 14(3), p.212-215.

Beetz, R. (2003) Mild dehydration: a risk factor of urinary tract infection? *European Journal of Clinical Nutrition,* 57(Suppl 2), p.S52-S58.

Begum, M.N. & Johnson, C.S. (2010) A review of the literature on dehydration in the institutionalized elderly. *The European e-Journal of Clinical Nutrition and Metabolism,* 5(1), p.e47-e53.

Benelam, B. & Wyness, L. (2010) Hydration and health: a review. *Nutrition Bulletin,* 35(1), p.3-25.

Bennett, B. & Provost, L. (2015) What is your theory? Driver diagram serves as tool for building and testing theories for improvement. *Quality Progress,* July, p.36-43.

Bennett, C. (2010) At A Glance' Fluid Balance Bar Chart. London: NHS Institute for Innovation and Improvement.

Bennett, J.A., Thomas, V. & Riegel, B. (2004) Unrecognized chronic dehydration in older adults: examining prevalence rate and risk factors. *Journal of Gerontological Nursing,* 30(11), p.22-28; quiz 52-53.

Berwick, D.M. (2011) Preparing nurses for participation in and leadership of continual improvement. *The Journal of Nursing Education,* 50(6), p.322-327.

Beyea, S.C. & Nicoll, L.H. (2000) Methods to conduct focus groups and the moderator's role. *AORN Journal,* 71(5), p.1067-1068.

Blau, J. (2005) Water deprivation: A new migraine precipitant. *Headache,* 45(6), p.757-759.

Blau, J., Kell, C. & Sperling, J. (2004) Water-deprivation headache: A new headache with two variants. *Headache,* 44(1), p.79-83.

Bloor, M. (2001) *Focus groups in social research.*

Boaden, R., Harvey, G., Moxham, C. & Proudlove, N. (2008) *Quality Improvement: Theory and Practice in Healthcare.* Coventry: NHS Institute for Innovation and Improvement.

Boler, I., Davis, A., Extermann, M. & Overcash, J. (2007) Muscle weakness, dehydration, and confusion, but not anemia and fatigue, are associated with falls in older cancer patients receiving chemotherapy. *Critical Reviews in Oncology Hematology,* 64, p.S36-S36.

Bonner, J. & Harris, W. (1988) *Healthy aging: new directions in health, biology and medicine.* Claremont, CA: Hunter House.

Borghi, L., Meschi, T., Amato, F., Briganti, A., Novarini, A. & Giannini, A. (1996) Urinary volume, water and recurrences in idiopathic calcium nephrolithiasis: A 5-year randomized prospective study. *Journal of Urology,* 155(3), p.839-843.

Boynton, P.M. & Greenhalgh, T. (2004) Hands-on guide to questionnaire research: Selecting, designing, and developing your questionnaire. *BMJ: British Medical Journal,* 328(7451), p.1312-1315.

Braun, V. & Clarke, V. (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology,* 3(2), p.77-101.

British Geriatrics Society (2011) *Quest for Quality: Inquiry into the quality of healthcare support for older people in care homes: A call for leadership, partnership and quality improvement.* London: British Geriatrics Society.

Brownie, S. & Nancarrow, S. (2013) Effects of person-centered care on residents and staff in aged-care facilities: a systematic review. *Clinical Interventions in Aging,* 8, p.1-10.

Byrne, J., Xu, G. & Carr, S. (2015) DEVELOPING AN INTERVENTION TO PREVENT ACUTE KIDNEY INJURY: USING THE PLAN, DO, STUDY, ACT (PDSA) SERVICE IMPROVEMENT APPROACH. *Journal of Renal Care,* 41(1), p.3-8.

Cade, J., Thompson, R., Burley, V. & Warm, D. (2002) Development, validation and utilisation of food-frequency questionnaires – a review. *Public Health Nutrition,* 5(4), p.567-587.

Callum, K., Gray, A., Hoile, R., Ingram, G., Martin, I., Sherry, K. & Whimster, F. (2013) *Extremes of age. The 1999 Report of the National Confidential Enquiry into Perioperative Deaths.* [Online]. Available at: http://www.ncepod.org.uk/1999ea.htm [Accessed: 12/12/2013].

Cammer, A., Morgan, D., Stewart, N., McGilton, K., Rycroft-Malone, J., Dopson, S. & Estabrooks, C. (2014) The Hidden Complexity of Long-Term Care: how context mediates knowledge translation and use of best practices. *The Gerontologist,* 54(6), p.1013.

Campbell, N. (2011) Dehydration: why is it still a problem? *Nursing Times,* 107(22), p.12-15.

Caplan, N. (1979) The Two-Communities Theory and Knowledge Utilization. *American Behavioral Scientist,* 22(3), p.459-470.

Caraceni, P., Domenicali, M., Tovoli, A., Napoli, L., Ricci, C.S., Tufoni, M. & Bernardi, M. (2013) Clinical indications for the albumin use: Still a controversial issue. *European Journal of Internal Medicine,* 24(8), p.721-728.

Care Quality Commission (2010) *Essential standards of quality and safety*. London. Care Quality Commission.

Care Quality Commission (2012a) *Health care in care homes. A special review of the provision of health care to those in care homes.* Care Quality Commission.

Care Quality Commission (2012b) *Time to listen in care homes. Dignity and nutrition inspection programme.* : Care Quality Commission.

Chassagne, P., Druesne, L., Capet, C., Ménard, J. & Bercoff, E. (2006) Clinical Presentation of Hypernatremia in Elderly Patients: A Case Control Study. *Journal of the American Geriatrics Society,* 54(8), p.1225-1230.

Chernoff, R. (1994) Nutritional requirements and physiological changes in aging. 52(suppl):S3– S5. *Nutritional Review,* 52(Supplement), p.S3-S5.

Cheuvront, S. & Sawka, M. (2005) Hydration assessment of athletes. *Sse 97,* 18(2), p.1-12.

Chiasson, J., ArisJilwan, N., Belanger, R., Bertrand, S., Beauregard, H., Ekoe, J., Fournier, H. & Havrankova, J. (2003) Diagnosis and treatment of diabetic ketoacidosis and the hyperglycemic hyperosmolar state. *CMAJ Canadian Medical Association Journal,* 168(7), p.859-866.

Chuang, Y. & Abbey, J. (2009) The culture of a Taiwanese nursing home. *Journal of Clinical Nursing,* 18(11), p.1640-1648.

Cicmanec, J.F., Shank, R.A. & Evans, A.T. (1985) Overnight concentration of urine. Natural defense mechanism against urinary tract infection. *Urology,* 26(2), p.157-159.

Clark, W.F., Sontrop, J.M., Macnab, J.J., Suri, R.S., Moist, L., Salvadori, M. & Garg, A.X. (2011) Urine Volume and Change in Estimated GFR in a Community-Based Cohort Study. *Clinical Journal of the American Society of Nephrology,* 6(11), p.2634-2641.

Cloutier, D., Cox, A., Kampen, R., Kobayashi, K., Cook, H., Taylor, D. & Gaspard, G. (2016) A Tale of Two Sites: Lessons on Leadership from the Implementation of a Long-term Care Delivery Model (CDM) in Western Canada. *Healthcare (Basel, Switzerland),* 4(1), p.3.

Comas, V. & Polanco, A. (2005) Case-control study of risk factors associated with constipation. The FREI Study. *Anales De Pediatría,* 62(4), p.340-345.

Comondore, V.R., Devereaux, P.J., Zhou, Q., Stone, S.B., Busse, J.W., Ravindran, N.C., Burns, K.E., Haines, T., Stringer, B., Cook, D.J., Walter, S.D., Sullivan, T., Berwanger, O., Bhandari, M., Banglawala, S., Lavis, J.N., Petrisor, B., Schünemann, H., Walsh, K., Bhatnagar, N. & Guyatt, G.H. (2009) Quality of care in for-profit and not-for-profit nursing homes: systematic review and meta-analysis. *BMJ: British Medical Journal,* 339(7717), p.381-384.

Copeman, J. (2000) Promoting nutrition in older people in nursing and residential homes. *British Journal of Community Nursing, 2000, Vol 5, no 6,* 5(6), p.277-284.

Cowan, D.T., Roberts, J.D., Fitzpatrick, J.M., While, A.E. & Baldwin, J. (2004) *Nutritional status of older people in long term care settings: current status and future directions. ScienceDirect* [Online]. Available at: http://www.sciencedirect.com.ezproxy.uwl.ac.uk/science/article/pii/S0020748903001317.

Crowe, M.J., Forsling, M.L., Rolls, B.J., Phillips, P.A., Ledingham, J.G.G. & Smith, R.F. (1987) Altered water excretion in healthy elderly men. *Age and Ageing,* 16(5), p.285-293.

Culp, K., Mentes, J. & Wakefield, B. (2003) Hydration and Acute Confusion in Long-Term Care Residents. *Western Journal of Nursing Research,* 25(3), p.251-266.

Culp, K., Tripp-Reimer, T., Wadle, K., Wakefield, B., Akins, J., Mobily, P. & Kundradt, M. (1997) Screening for acute confusion in elderly long-term care residents. *The Journal of Neuroscience Nursing : Journal of the American Association of Neuroscience Nurses,* 29(2), p.86.

Cummings, G., Mallidou, A., Masaoud, E., Kumbamu, A., Schalm, C., Laschinger, H. & Estabrooks, C. (2014; 2013) On becoming a coach: A pilot intervention study with managers in long-term care. *Health Care Management Review,* 39(3), p.198-209.

Cupchik, G. (2001) Constructivist Realism: An Ontology That Encompasses Positivist and Constructivist Approaches to the Social Sciences. *Forum : Qualitative Social Research,* 2(1).

Curnock, E., Bowie, P. & McKay, J. (2012) Barriers and attitudes influencing non-engagement in a peer feedback model to inform evidence for GP appraisal. *BMC Medical Education,* , p.12-15.

Curran, E.T. & Bunyan, D. (2012) Using a PDSA cycle of improvement to increase preparedness for, and management of, norovirus in NHS Scotland. *The Journal of Hospital Infection,* 82(2), p.108.

Dahlke, S., Hall, W. & Phinney, A. (2015) Maximizing Theoretical Contributions of Participant Observation While Managing Challenges. *Qualitative Health Research,* 25(8), p.1117-1122.

Damschroder, L.J. & Hagedorn, H.J. (2011) A Guiding Framework and Approach for Implementation Research in Substance Use Disorders Treatment. *Psychology of Addictive Behaviors,* 25(2), p.194-205.

Danone Research and Hydration for Health Initiative (2010) *Hydration in the aging. A review of current knowledge.* [Online]. Available at: www.h4hinitiative.com/toolspublications/publications/monographs.

Davies, P., Walker, A. & Grimshaw, J. (2010) A systematic review of the use of theory in the design of guideline dissemination and implementation strategies and interpretation of the results of rigorous evaluations. *Implementation Science,* 5(1), p.14-14.

Dawda, P. & Raymond, M. (2016) Measurement for improvement. *Innovait,* 10(1), p.51-56.

de Bucourt, M., Busse, R., Güttler, F., Reinhold, T., Vollnberg, B., Kentenich, M., Hamm, B. & Teichgräber, U.K. (2012) Process mapping of PTA and stent placement in a university hospital interventional radiology department. *Insights into Imaging,* 3(4), p.329-336.

Denny, M. & Dawson, T. (1975) Effects of dehydration on body-water distribution in desert kangaroos. *American Journal of Physiology.,* 229(1), p.251-254.

Deurenberg, P. & Schouten, F. (1992) Loss of total-body water and extracellular water assessed by multifrequency impedance. *European Journal of Clinical Nutrition,* 46(4), p.247-255.

DeWalt, K. & DeWalt, B. (1998) Participant observation. In H. Russell Bernard (Ed.), Handbook of methods in cultural anthropology. In: Walnut Creek: AltaMira Press., p.259-300.

Dill, D.B. & Costill, D.L. (1974) Calculation of percentage changes in volumes of blood, plasma, and red cells in dehydration. *Journal of Applied Physiology,* 37(2), p.247-248.

Dimant, J. (2001) Delivery of Nutrition and Hydration Care in Nursing Homes: Assessment and Interventions to Prevent and Treat Dehydration, Malnutrition, and Weight Loss. *Journal of the American Medical Directors Association,* 2(4), p.175-182.

Donahue, J. & Lowenthal, D. (1997) Nocturnal polyuria in the elderly person. *American Journal of the Medical Sciences,* 314(4), p.232-238.

Donoghue, C. (2010) Nursing Home Staff Turnover and Retention: An Analysis of National Level Data. *Journal of Applied Gerontology,* 29(1), p.89-106.

Dunne, T.E., Neargarder, S.A., Cipolloni, P.B. & Cronin-Golomb, A. (2004) Visual contrast enhances food and liquid intake in advanced Alzheimer's disease. *Clinical Nutrition,* 23(4), p.533-538.

Eaton, D., Bannister, P., Mulley, G.P. & Connolly, M.J. (1994) Axillary Sweating in Clinical Assessment of Dehydration in Ill Elderly Patients. *Bmj,* 308(6939), p.1271.

Eckford, S.D., Keane, D.P., Lamond, E., Jackson, S.R. & Abrams, P. (1995) Hydration monitoring is the prevention of recurrent idiopathic urinary tract infections in pre-menopausal women. *British Journal of Urology,* 76(1), p.90-93.

El-Sharkawy, A., Sahota, O., Maughan, R. & Lobo, D. (2014) The pathophysiology of fluid and electrolyte balance in the older adult surgical patient. *Clinical Nutrition,* 33(1), p.6-13.

Erkert, J.D. (1988) Dehydration in the elderly. *J Am Acad Physician Assist,* 1, p.261-269.

Estabrooks, C., Squires, J., Carleton, H., Cummings, G. & Norton, P. (2015) Who is Looking After Mom and Dad? Unregulated Workers in Canadian Long-Term Care Homes. *Canadian Journal on Aging-Revue Canadienne Du Vieillissement,* 34(1), p.47-59.

Farrell, J. & Petrik, S. (2009) Hydration and Nosocomial Pneumonia: Killing Two Birds with One Stone (a Toothbrush). *Rehabilitation Nursing Journal,* 34(2), p.47-50.

Fathima, N. (2016) A quality improvement tool - driver diagram: a model of driver diagram to reduce primary caesarean section rates. *International Journal of Research in Medical Sciences,* 4(5), p.1339-1342.

Featherstone, I., Hopton, A. & Siddiqi, N. (2010) An intervention to reduce delirium in care homes. *Nursing Older People,* 22(4), p.16.

Feilzer, M. (2010) Doing Mixed Methods Research Pragmatically: Implications for the Rediscovery of Pragmatism as a Research Paradigm. *Journal of Mixed Methods Research,* 4(1), p.6-16.

Feinfeld, D.A., Bargouthi, H., Niaz, Q. & Carvounis, C.P. (2002) Massive and disproportionate elevation of blood urea nitrogen in acute azotemia. *International Urology and Nephrology,* 34(1), p.143.

Fern, E.F. (1982) The Use of Focus Groups for Idea Generation: The Effects of Group Size, Acquaintanceship, and Moderator on Response Quantity and Quality. *Journal of Marketing Research,* 19(1), p.1-13.

Ferry, M., Dal Canton, A., Manz, F., Armstrong, L., Sawka, M., Ritz, P. & Rosenberg, I. (2005) Strategies for ensuring good hydration in the elderly. *Nutrition Reviews,* 63(6), p.S22-29.

Francis, R. (2013) *The Mid Staffordshire NHS Foundation Trust public inquiry*. Stationery Office.

Friedman, S.A. & Gladstone, J.L. (1971) The effects of hydration and bladder incubation time on urine colony counts. *The Journal of Urology,* 105(3), p.428-432.

Gage, H., Goodman, C., Davies, S.L., Norton, C., Fader, M., Wells, M., Morris, J. & Williams, P. (2010) Laxative use in care homes. *Journal of Advanced Nursing,* 66(6), p.1266-1272.

Ganio, M.S., Armstrong, L.E., Casa, D.J., McDermott, B.P., Lee, E.C., Yamamoto, L.M., Marzano, S., Lopez, R.M., Jimenez, L., Le Bellego, L., Chevillotte, E. & Lieberman, H.R. (2011) Mild dehydration impairs cognitive performance and mood of men. *British Journal of Nutrition,* 106(10), p.1535-1543.

Gaspar, P.M. (1988) What determines how much patients drink?. *Geriatric Nursing (New York, N.Y.),* 9(4), p.221-224.

Gaspar, P.M. (1999) Water intake of nursing home residents. *Journal of Gerontological Nursing,* 25(4), p.23-29.

Gault, R.H. (1907) A History of the Questionnaire Method of Research in Psychology. *The Pedagogical Seminary,* 14(3), p.366-383.

George, J. & Rockwood, K. (2004) Dehydration and Delirium — Not a Simple Relationship. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences,* 59(8), p.M811-M812.

Gibbons, M. (2008) Why is knowledge translation important? Grounding the conversation. *Focus: Technical Brief,* 21.

Giddings, L.S. (2006) Mixed-methods research: Positivism dressed in drag? *Journal of Research in Nursing,* 11(3), p.195-203.

Gille, D. (2010) Overview of the physiological changes and optimal diet in the golden age generation over 50. *Eur Rev Aging Act,* 7(1), p.27-36.

Gillham, B. (2008) *Developing a questionnaire.* 2nd ed. London: Continuum.

Godfrey, H., Cloete, J., Dymond, E. & Long, A. (2012) An exploration of the hydration care of older people: a qualitative study. *International Journal of Nursing Studies,* 49(10), p.1200.

Going, S., Williams, D. & Lohman, T. (1995) Aging and body composition: biological changes and methodological issues. *Exercise and Sport Sciences Reviews,* 23, p.411.

Goodman, C., Gordon, A.L., Martin, F., Davies, S.L., Iliffe, S., Bowman, C., Schneider, J., Meyer, J., Victor, C., Gage, H., Gladman, J.R. & Dening, T. (2014) Effective health care for older people resident in care homes: the optimal study protocol for realist review. *Systematic Reviews,* 3(1), p.49-49.

Gopinathan, P.M., Pichan, G. & Sharma, V.M. (1988) Role of dehydration in heat stress-induced variations in mental performance. *Archives of Environmental Health,* 43(1), p.15-17.

Graverholt, B., Riise, T., Jamtvedt, G., Ranhoff, A.H., Krüger, K. & Nortvedt, M.W. (2011) Acute hospital admissions among nursing home residents: a population-based observational study. *BMC Health Services Research,* 11(1), p.126-126.

Gross, C.R., Lindquist, R.D., Woolley, A.C., Granieri, R., Allard, K. & Webster, B. (1992) Clinical indicators of dehydration severity in elderly patients. *Journal of Emergency Medicine,* 10(3), p.267-274.

Guba, E.G. & Lincoln, Y.S. (1994) Competing paradigms in qualitative research In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 105-117). London: Sage. In:.

Guba, E.G. (1990) *The paradigm dialog.*

Gubb, J. (2009) Have targets done more harm than good in the English NHS? Yes. *Bmj,* 338(jan16 2), p.a3130-a3130.

Gudivaka, R., Schoeller, D. & Kushner, R.F. (1996) Effect of skin temperature on multifrequency bioelectrical impedance analysis. *Journal of Applied Physiology (Bethesda, Md.: 1985),* 81(2), p.838.

Guest, G., MacQueen, K.M. & Namey, E.E. (2012) *Applied thematic analysis.* Thousand Oaks, Calif; London: SAGE.

Guyton, A. (1976) *Textbook of medical physiology.* 5th ed.

Hall, R. (2012) Mixed Methods: In search of a paradigm in Conducting Research in a Changing and Challenging World, Chapter: Chapter 7:, Publisher: Nova Science Publishers Inc., Editors: Thao Le and Quynh Le, pp.71 - 78. In:.

Hall, S., Longhurst, S. & Higginson, I. (2009) Challenges to conducting research with older people living in nursing homes. *BMC Geriatrics,* 9(1), p.38-38.

Hallett, N. & Hewison, A. (2012) How to address the physical needs of clients in a mental health setting. *Nursing Management (Harrow, London, England : 1994),* 18(10), p.30.

Harrison, M.H. (1985) Effects of thermal stress and exercise on blood volume in humans. *Physiological Reviews,* 65(1), p.149-209.

Hart M. & Adamek, C. (1984) Do increased fluids decrease urinary stone formation?. *Geriatric Nursing (New York, N.Y.),* 5(6), p.245-248.

Harvath, T., Swafford, K., Smith, K., Miller, L., Volpin, M., Sexson, K., White, D. & Young, H. (2008) Enhancing Nursing Leadership in Long-Term Care A Review of the Literature. *Research in Gerontological Nursing,* 1(3), p.187-196.

Haveman-Nies, A., de Groot, L.C. & Van Staveren, W.A. (1997) Fluid intake of elderly Europeans. *The Journal of Nutrition, Health & Aging,* 1(3), p.151.

Havig, A., Skogstad, A., Kjekshus, L. & Romoren, T. (2011) Leadership, staffing and quality of care in nursing homes. *Bmc Health Services Research,* 11(1), p.327-327.

Healthcare Improvement Scotland (2011) *Improving nutrition...Improving care* [Online]. Available at: http://www.healthcareimprovementscotland.org/our_work/patient_safety/nutritional_care_resources/improving_nutrition_event.aspx.

Hebert, L., Greene, T., Levey, A., Falkenhain, M. & Klahr, S. (2003) High urine volume and low urine osmolality are risk factors for faster progression of renal disease. *American Journal of Kidney Diseases,* 41(5), p.962-971.

Himmelstein, D.U., Jones, A.A. & Woolhandler, S. (1983) Hypernatremic dehydration in nursing home patients: An indicator of neglect. *Journal of the American Geriatrics Society,* 31(8), p.466-471.

Hines, P., Holwe, M. & Rich, N. (2004) Learning to evolve - A review of contemporary lean thinking. *International Journal of Operations & Production Management,* 24(9-10), p.994-1011.

Hodak, S.P. & Verbalis, J.G. (2005) Abnormalities of water homeostasis in aging. *Endocrinology and Metabolism Clinics of North America,* 34(4), p.1031-1046.

Hodgkinson, B., Evans, D. & Wood, J. (2001) Maintaining oral hydration in older people: a systematic review. *The JBI Database of Systematic Reviews and Implementation Reports,* 4(1).

Hodgkinson, B., Evans, D. & Wood, J. (2003) Maintaining oral hydration in older adults: A systematic review. *International Journal of Nursing Practice,* 9(3), p.S19-S28.

Holbrook, A., Green, M., Krosnick, J. (2003) Telephone versus Face-to-Face Interviewing of National Probability Samples with Long Questionnaires: Comparisons of Respondent Satisficing and Social Desirability Response Bias. *Public Opinion Quarterly*, 67(1), p.79–125,

Holmgren, J., Emami, A., Eriksson, L.E. & Eriksson, H. (2013) Being perceived as a 'visitor' in the nursing staff's working arena – the involvement of relatives in daily caring activities in nursing homes in an urban community in Sweden. *Scandinavian Journal of Caring Sciences,* 27(3), p.677-685.

Holzapfel, S.K., Ramirez, R.F., Layton, M.S., Smith, I.W., Sagl-Massey, K. & DuBose, J.Z. (1996) Feeder position and food and fluid consumed by nursing home residents. *Journal of Gerontological Nursing,* 22(4), p.6-12.

Hong, C.S. (2013) Process mapping: a pathway for efficient service provision. *Nursing & Residential Care,* 15(8), p.558-560.

Hooper, L. (2016) Why, Oh Why, Are So Many Older Adults Not Drinking Enough Fluid? *Journal of the Academy of Nutrition and Dietetics,* 116(5), p.774-778.

Hooper, L., Abdelhamid, A., Attreed, N.J., Campbell, W.W., Channell, A.M., Chassagne, P., Culp, K.R., Fletcher, S.J., Fortes, M.B., Fuller, N., Gaspar, P.M., Gilbert, D.J., Heathcote, A.C., Kafri, M.W., Kajii, F., Lindner, G., Mack, G.W., Mentes, J.C., Merlani, P., Needham, R.A., Olde Rikkert, M.G.M., Perren, A., Powers, J., Ranson, S.C., Ritz, P., Rowat, A.M., Sjöstrand, F., Smith, A.C., Stookey, J.J.D., Stotts, N.A., Thomas, D.R., Vivanti, A., Wakefield, B.J., Waldréus, N., Walsh, N.P., Ward, S., Potter, J.F. & Hunter, P. (2015) Clinical symptoms, signs and tests for identification of impending and current water-loss dehydration in older people. *The Cochrane Database of Systematic Reviews,* 4, p.CD009647.

Hooper, L., Bunn, D., Downing, A., Jimoh, F., Groves, J., Free, C., Cowap, V., Potter, J., Hunter, P. & Shepstone, L. (2016) Which Frail Older People Are Dehydrated? The UK DRIE Study. *Journals of Gerontology Series a-Biological Sciences and Medical Sciences,* 71(10), p.1341-1347.

Hu TW, Huang LF, Cartwright WS (1986) Evaluation of the costs of caring for the senile demented elderly: a pilot study. *Gerontologist,* 26(2), p.158-163.

Iacono, J., Brown, A. & Holtham, C. (2009) Research Methods – a Case Example of Participant Observation. *Electronic Journal of Business Research Methods,* 7(1), p.39-46.

Iggulden, H. (1999) Dehydration and electrolyte disturbance. *Nursing Standard,* 13(19), p.48.

Institute for Healthcare Improvement (2012) *Update Antibiotic Stewardship Drivers and Change Package.* Institute for Healthcare Improvement.

Jimoh, F., Bunn, D. & Hooper, L. (2015) Assessment of a self-reported drinks diary for the estimation of drinks intake by care home residents: Fluid intake study in the elderly (FISE). *Journal of Nutrition Health & Aging,* 19(5), p.491-496.

Johnson, J.K., Farnan, J., Barach, P., Hesselink, G., Wollersheim, H.C., Pijnenborg, L., Kalkman, C., Arorah, V., HANDOVER Res Collaborative, HANDOVER Research Collaborative & on behalf of the HANDOVER Research Collaborative (2012) Searching for the missing pieces between the hospital and primary care: mapping the patient process during care transitions. *BMJ Quality and Safety,* 21(Suppl 1), p.i97-i105.

Johnson, R. & Onwuegbuzie, A. (2004) Mixed methods research: A research paradigm whose time has come. *Educational Researcher,* 33(7), p.14-26.

Johnson, R.B., Onwuegbuzie, A.J. & Turner, L.A. (2007) Toward a Definition of Mixed Methods Research. *Journal of Mixed Methods Research,* 1(2), p.112-133.

Kaasalainen, S., Williams, J., Hadjistavropoulos, T., Thorpe, L., Whiting, S., Neville, S. & Tremeer, J. (2010) Creating Bridges Between Researchers and Long-Term Care Homes to Promote Quality of Life for Residents. *Qualitative Health Research,* 20(12), p.1689-1704.

Kaplan, H.C., Provost, L.P., Froehle, C.M. & Margolis, P.A. (2012) The Model for Understanding Success in Quality (MUSIQ): building a theory of context in healthcare quality improvement. *BMJ Quality & Safety,* 21(1), p.13-20.

Karantzoulis, S. & Galvin, J. (2011) Distinguishing Alzheimer's disease from other major forms of dementia. *Expert Review of Neurotherapeutics,* 11(11), p.1579-1591.

Kavouras, S.A. (2002) Assessing hydration status. *Current Opinion in Clinical Nutrition and Metabolic Care,* 5(5), p.519.

Kawulich, B. (2005) Participant Observation as a Data Collection Method. *Forum: Qualitative Social Research,* 6(2).

Kaye, D. (1968) Antibacterial activity of human urine. *Journal of Clinical Investigation,* 47(10), p.2374-2390.

Kayser-Jones, J. (2002) Malnutrition, dehydration, and starvation in the midst of plenty: the political impact of qualitative inquiry. *Qualitative Health Research,* 12(10), p.1391-1405.

Kayser-Jones, J. (2009) Nursing homes: a health-promoting or dependency-promoting environment? *Family & Community Health,* 32(1 Suppl), p.S66.

Kayser-Jones, J., Schell, E., Lyons, W., Kris, A.E. & al, E. (2003) Factors That Influence End-of-Life Care in Nursing Homes: The Physical Environment, Inadequate Staffing, and Lack of supervision. *The Gerontologist,* 43(Supplement 2), p.76-84.

KayserJones, J., Schell, E., Porter, C., Barbaccia, J. & Shaw, H. (1999) Factors Contributing to Dehydration in Nursing Homes: Inadequate Staffing and Lack of Professional Supervision. *Journal of the American Geriatrics Society,* 47(10), p.1187-1194.

Kayser-Jones, J.S. (1982) Institutional structures: catalysts of or barriers to quality care for the institutionalized aged in Scotland and the U.S. *Social Science & Medicine (1982),* 16(9), p.935.

Kenney, W. & Chiu, P. (2001) Influence of age on thirst and fluid intake. *Medicine and Science in Sports and Exercise,* 33(9), p.1524-1532.

Kerr, M., Bedford, M., Matthews, B. & O'Donoghue, D. (2014) The economic impact of acute kidney injury in England. *Nephrology Dialysis Transplantation,* Ahead of print.

Khorami MH, Hashemi R, Bagherian-Sararoudi R, Sichani MM, Tadayon F, Shahdoost AA & Arezegar SH (2012) The assessment of 24 24-h urine volume by measurement of urine specific gravity with dipstick in adults with nephrolithiasis. *Advanced Biomedical Research,* 1, p.86.

Kilpatrick, K.E., Lohr, K.N., Leatherman, S., Pink, G., Buckel, J.M., Legarde, C. & Whitener, L. (2005) The insufficiency of evidence to establish the business case for quality. *International Journal for Quality in Health Care : Journal of the International Society for Quality in Health Care / ISQua,* 17(4), p.347-355.

Kinoshita, K., Hattori, K., Ota, Y., Kanai, T., Shimizu, M., Kobayashi, H. & Tokuda, Y. (2013) The measurement of axillary moisture for the assessment of dehydration among older patients: A pilot study. *Experimental Gerontology,* 48(2), p.255-258.

Kitzinger, J. (1995) Qualitative Research: Introducing focus groups. *British Medical Journal,* 311(7000), p.299-302.

Koester, S. & Hoffer, L. (1994) Indirect Sharing: Additional Risks Associated with Drug Injection. *AIDS and Public Policy,* 9(2), p.100-105.

Kovacs, E.M., Senden, J.M. & Brouns, F. (1999) Urine color, osmolality and specific electrical conductance are not accurate measures of hydration status during postexercise rehydration. *The Journal of Sports Medicine and Physical Fitness,* 39(1), p.47.

Kruger, J. & Dunning, D. (1999) Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments. *Journal of Personality and Social Psychology,* 77(6), p.1121-1134.

Kruse, R., Mehr, D., Boles, K., Lave, J., Binder, E., Madsen, R. & D'Agostino, R. (2004) Does hospitalization impact survival after lower respiratory infection in nursing home residents? *Medical Care*, 42(9), p.860-870.

Kuhn, T.S. (2012) *The structure of scientific revolutions.* 4th, 50th anniversary ed. London; Chicago, [Ill.]: University of Chicago Press.

Langley, G. (1996) *The improvement guide: a practical approach to enhancing organizational performance* 1st ed. San Francisco: Jossey-Bass Publishers.

Langley, G., Moen, R., Nolan, K., Nolan, T., Norman, C. & Provost, L. (2009) *The Improvement Guide:a Practical Approach to Enhancing Organisational Performance.* 2nd ed. San Francisco, CA: Jossey Bass.

Lavis, J.N., Robertson, D., Woodside, J.M., McLeod, C.B., Abelson, J., The Knowledge Transfer Study Group, Knowledge Transfer Study Grp & Knowledge Transfer Study Group (2003) How Can Research Organizations More Effectively Transfer Research Knowledge to Decision Makers? *The Milbank Quarterly,* 81(2), p.221-248.

Lecko, C. (2008) Improving hydration: an issue of safety. *Nursing and Residential Care,* 10(3), p.149-150.

Lecko, C. (2013) Hydration - the missing part of nutritional care. *Nursing Times,* 109(26), p.12-14.

Leonard, M. (2004) The human factor: the critical importance of effective teamwork and communication in providing safe care. *Quality and Safety in Health Care,* 13(suppl_1), p.i85-i90.

Leung, F. & Savithiri, R. (2009) Spotlight on focus groups. *Canadian Family Physician Médecin De Famille Canadien,* 55(2), p.218.

Liberatore, M. (2013) Six Sigma in healthcare delivery. *International Journal of Health Care Quality Assurance,* 26(7), p.601-626.

Lieberman, H. (2007) Hydration and cognition: A critical review and recommendations for future research. *Journal of the American College of Nutrition,* 26(5), p.555S-561S.

Lilja, M., Bergh, A., Johansson, L. & NygÅrd, L. (2003) Attitudes towards rehabilitation needs and support from assistive technology and the social environment among elderly people with disability. *Occupational Therapy International,* 10(1), p.75-93.

Lin, S. (2013) A Pilot Study: Fluid Intake and Bacteriuria in Nursing Home Residents in Southern Taiwan. *Nursing Research,* 62(1), p.66-72.

Lindeman, R., Romero, L., Liang, H., Baumgartner, R., Koehler, K. & Garry, P. (2000) Do elderly persons need to be encouraged to drink more fluid? *J. Gerontol. Med. Sci,* 55A, p.M361-M365.

Longmore, J.M. (2007) *Oxford handbook of clinical medicine.* Oxford: Oxford University Press.

Lotan, Y., Daudon, M., Bruyère, F., Talaska, G., Strippoli, G., Johnson, R.J. & Tack, I. (2013) Impact of fluid intake in the prevention of urinary system diseases: a brief review. *Current Opinion in Nephrology and Hypertension,* 22 Suppl 1, p.S1.

Luckey, E. & Parsa, J. (2003) Fluid and Electrolytes in the Aged. *Archives of Surgery,* 138(10), p.1055-1060.

Lunn, J. & Foxen, R. (2008) How much water do we really need? *Nutrition Bulletin,* 33(4), p.336-342.

Lynn, J., Nolan, K., Kabcenell, A., Weissman, D., Milne, C., Berwick, D.M., for the End-of-Life Care Consensus Panel & End-of-Life Care Consensus Panel (2002) Reforming Care for Persons Near the End of Life: The Promise of Quality Improvement. *Annals of Internal Medicine,* 137(2), p.117.

Mahowald, J.M. & Himmelstein, D.U. (1981) Hypernatremia in the elderly: Relation to infection and mortality. *Journal of the American Geriatrics Society,* 29(4), p.177-180.

Maitra, K.K. & Junkins, M.D. (2004) Upper extremity movement pattern of a common drinking task in well elderly women: a pilot study. *Occupational Therapy International,* 11(2), p.67-81.

Mange, K., Matsuura, D., Cizman, B., Soto, H., Ziyadeh, F.N., Goldfarb, S. & Neilson, E.G. (1997) Language guiding therapy: the case of dehydration versus volume depletion. *Annals of Internal Medicine,* 127(9), p.848.

Mansell, I., Bennett, G., Northway, R., Mead, D. & Moseley, L. (2004) The learning curve: the advantages and disadvantages in the use of focus groups as a method of data collection. *Nurse Researcher,* 11(4), p.79.

Manz, F. & Wentz, A. (2003) 24-h hydration status: parameters, epidemiology and recommendations. *European Journal of Clinical Nutrition,* 57(S2), p.S10-S18.

Manz, F. & Wentz, A. (2005) Hydration Status in the United States and Germany. *Nutrition Reviews,* 63(Supplement 1), p.55-62.

Manz, F. (2007) Hydration and disease. *Journal of the American College of Nutrition,* 26(5 Suppl), p.535S-541S.

Martini, F. (2004) *Fundamentals of anatomy & physiology.* 6th ed.

Masento, N.A., Golightly, M., Field, D.T., Butler, L.T. & van Reekum, C.M. (2014) Effects of hydration status on cognitive performance and mood. *The British Journal of Nutrition,* 111(10), p.1841.

Mason, S.E., Nicolay, C.R. & Darzi, A. (2015) *The use of Lean and Six Sigma methodologies in surgery: A systematic review. ScienceDirect* [Online]. Available at: http://www.sciencedirect.com.ezproxy.uwl.ac.uk/science/article/pii/S1479666X14001024.

Mathison, S. (1988) Why Triangulate? *Educational Researcher,* 17(2), p.13-17.

Matthews, S.J. & Lancaster, J.W. (2011) Urinary Tract Infections in the Elderly Population. *The American Journal of Geriatric Pharmacotherapy,* 9(5), p.286-309.

Mays, N. & Pope, C. (1995) Qualitative Research: Rigour and qualitative research. *British Medical Journal,* 311(6997), p.109-112.

Mazza, I. (2012) *Six Sigma management strategy: methods & tools.*

Mazzola, B.L., von Vigier, R.O., Marchand, S., Tonz, M. & Bianchetti, M.G. (2003) Behavioral and functional abnormalities linked with recurrent urinary tract infections in girls. *Journal of Nephrology,* 16(1), p.133-138.

McCurdy, P. & Uldam, J. (2014) Connecting Participant Observation Positions: Toward a Reflexive Framework for Studying Social Movements. *Field Methods,* 26(1), p.40-55.

McGee, S., Abernethy, 3.,W B. & Simel, D.L. (1999) The rational clinical examination. Is this patient hypovolemic? *Jama,* 281(11), p.1022.

McGreevy, J. (2016) Implementing culture change in long-term dementia care settings. *Nursing Standard (Royal College of Nursing (Great Britain) : 1987),* 30(19), p.44.

Mentes, J. (2006a) Oral Hydration in Older Adults: Greater awareness is needed in preventing, recognizing, and treating dehydration. *American Journal of Nursing,* 106(6), p.40-49.

Mentes, J., Culp, K., Maas, M. & Rantz, M. (1999) Acute confusion indicators: risk factors and prevalence using MDS data. *Research in Nursing & Health,* 22(2), p.95-105.

Mentes, J., Wakefield, B. & Culp, K. (2006b) Use of a urine color chart to monitor hydration status in nursing home residents. *Biological Research for Nursing,* 7(3), p.197-203.

Mentes, J.C. & Culp, K. (2003) Reducing hydration-linked events in nursing home residents. *Clinical Nursing Research,* 12(3), p.210-225.

Mentes, J.C. & Tripp-Reimer, T. (2002) Barriers and Facilitators in Nursing Home Intervention Research. *Western Journal of Nursing Research,* 24(8), p.918-936.

Mentes, J.C. & Wang, J. (2011) Measuring risk for dehydration in nursing home residents: evaluation of the dehydration risk appraisal checklist. *Research in Gerontological Nursing,* 4(2), p.148.

Mentes, J.C. (2006b) A typology of oral hydration problems exhibited by frail nursing home residents. *Journal of Gerontological Nursing,* 32(1), p.13-19.

Mentes, J.C., Chang, B.L., Morris, J. & McCabe, B.W. (2006a) Keeping Nursing Home Residents Hydrated / Commentaries / Response. *Western Journal of Nursing Research,* 28(4), p.392.

Merton, R. & Kendall, P. (1946) The Focused Interview. *American Journal of Sociology,* 51(6), p.541-557.

Michaud, D., Spiegelman, D., Clinton, S., Rimm, E., Curhan, G., Willett, W. & Giovannucci, E. (1999) Fluid intake and the risk of bladder cancer in men. *New England Journal of Medicine,* 340(18), p.1390-1397.

Miescher, E. & Fortney, S.M. (1989) Responses to dehydration and rehydration during heat exposure in young and older men. *American Journal of Physiology - Regulatory Integrative and Comparative Physiology,* 257(5), p.26/5.

Miller, M. (1997) Fluid and electrolyte homeostasis in the elderly: Physiological changes of ageing and clinical consequences. *Baillière's Clinical Endocrinology and Metabolism,* 11(2), p.367-387.

Mohammed, M. & Worthington, P. (2013) Why traditional statistical process control charts for attribute data should be viewed alongside an xmr-chart. *Bmj Quality & Safety,* 22(3), p.263-269.

Morgan, A., Masterson, M., Fahlman, M., Topp, R. & Boardley, D. (2003) Hydration status of community-dwelling seniors. *Aging Clinical and Experimental Research,* 15(4), p.301-304.

Morgan, D.L. (2007) Paradigms Lost and Pragmatism Regained: Methodological Implications of Combining Qualitative and Quantitative Methods. *Journal of Mixed Methods Research,* 1(1), p.48-76.

Moussavi, M., Rodriguez, G., Turkel-Parrella, D., Siddique, U., Carlowicz, C., Botros, D., Ibrahim, M., Gizzi, M. & Kirmani, J. (2012.) The hydration influence on the risk of ischemic stroke outcome (thirst-O) study. *Neurology,* 78 (Meeting Abstracts 1).

Muething, S., Goudie, A., Schoettker, P., Donnelly, L., Goodfriend, M., Bracke, T., Brady, P., Wheeler, D., Anderson, J. & Kotagal, U. (2012) Quality Improvement Initiative to Reduce Serious Safety Events and Improve Patient Safety Culture. *Pediatrics,* 130, p.e423-e431.

Munn, P. & Drever, E. (1990) *Using Questionnaires in Small-Scale Research. A Teachers' Guide.*

Munroe, D., Kaza, P. & Howard, D. (2011) Culture-Change Training: Nursing Facility Staff Perceptions of Culture Change. *Geriatric Nursing,* 32(6), p.400-407.

Needy, K.L., Gokhan, N.M., Bilec, M.M., Ries, R., Horman, M.J., Phelps, A.F. & Enache-Pommer, E. (2008) The Use of Process Mapping to Compare Green Children's Hospital Designs. *IIE Annual Conference.Proceedings,* , p.1220.

Nicolle, L.E., Strausbaugh, L.J. & Garibaldi, R.A. (1996) Infections and antibiotic resistance in nursing homes. *Clinical Microbiology Reviews,* 9(1), p.1-1.

Niemann, J.T. (2001) The Association Between Orthostatic Hypotension and Recurrent Falls in Nursing Home Residents. *Annals of Emergency Medicine,* 37(3), p.366.

Nightingale, J., Woodward, J.M. & Small Bowel and Nutrition Committee of the British Society of Gastroenterology (2006) Guidelines for management of patients with a short bowel. *Gut,* 55(Suppl 4), p.iv1-iv12.

NIH Technology Assessment Conference Statement (1994) *Bioelectrical Impedance Analysis in Body Composition Measurement.* Bethesda, MD. National Institutes of Health.

Nilsen, P. (2015) Making sense of implementation theories, models and frameworks. *Implementation Science,* 10(1), p.53.

Nolan, M., Davies, S., Brown, J., Wilkinson, A., Warnes, T., McKee, K., Flannery, J. & Stasi, K. (2008) The role of education and training in achieving change in care homes: a literature review. *Journal of Research in Nursing,* 13(5), p.411-433.

Norton, D., McLaren, R. & Exton-Smith, A. (1963) An Investigation Of Geriatric Nursing Problems In Hospital. *Public Health,* 77(5), p.317.

Nose, H., Morimoto, T. & Ogura, K. (1983) Distribution of water losses among fluid compartments of tissues under thermal dehydration in the rat. *The Japanese Journal of Physiology,* 33(6), p.1019-1029.

Nowell, L. (2015) Pragmatism and integrated knowledge translation: exploring the compatabilities and tensions. *Nurs Open,* 2, p.141-148.

O'Brien, C., Young, A.J. & Sawka, M.N. (2002) Bioelectrical impedance to estimate changes in hydration status. *International Journal of Sports Medicine,* 23(5), p.361.

Ogrinc, G., Davies, L., Goodman, D., Batalden, P., Davidoff, F. & Stevens, D. (2015) SQUIRE 2.0 (Standards for QUality Improvement Reporting Excellence): revised publication guidelines from a detailed consensus process. *The Journal of Continuing Education in Nursing,* 46(11), p.501.

Oppliger, R.A. & Bartok, C. (2002) Hydration testing of athletes. *Sports Medicine (Auckland, N.Z.),* 32(15), p.959.

Ormerod, J.K., Elliott, T.A., Scheett, T.P., VanHeest, J.L., Armstrong, L.E. & Maresh, C.M. (2003) Drinking behavior and perception of thirst in untrained women during 6 weeks of heat acclimation and outdoor training. *International Journal of Sport Nutrition and Exercise Metabolism,* 13(1), p.15.

Orvik, A., Larun, L., Berland, A. & Ringsberg, K. (2013) Situational Factors in Focus Group Studies: A Systematic Review. *International Journal of Qualitative Methods,* 12, p.338-358.

Ostaszkiewicz, J., O'Connell, B. & Dunning, T. (2016) 'We just do the dirty work': dealing with incontinence, courtesy stigma and the low occupational status of carework in long-term aged care facilities. *Journal of Clinical Nursing,* 25(17-18), p.2528-2541.

Padhy, K.C. (2013) Total Quality Management: An Overview. *Srusti Management Review,* 6(1), p.119.

Parahoo, K. (1993) Questionnaires: use, value and limitations. *Nurse Researcher,* 1(2), p.4-15.

Parke, B. & Hunter, K.F. (2014) The care of older adults in hospital: if it's common sense why isn't it common practice? *Journal of Clinical Nursing,* 23(11-12), p.1573-1582.

Patton, M.Q. (2002) *Qualitative research & evaluation methods.* 3rd ed. Thousand Oaks, Calif; London: Sage.

Perla, R.J., Provost, L.P. & Murray, S.K. (2011) The run chart: a simple analytical tool for learning from variation in healthcare processes. *BMJ Quality & Safety,* 20(1), p.46-51.

Perren, A., Markmann, M., Merlani, G., Marone, C. & Merlani, P. (2011) Fluid balance in critically ill patients. Should we really rely on it? *Minerva Anestesiologica,* 77(8), p.802-811.

Phillips, j. & Simmonds, L. (2013) Use of proces mapping in service improvement. *Nursing Times,* 109(17/18), p.24-26.

Phillips, P.A., Bretherton, M., Johnston, C.I. & Gray, L. (1991) Reduced osmotic thirst in healthy elderly men. *The American Journal of Physiology,* 261(1 Pt 2), p.R166-171.

Phillips, P.A., Rolls, B.J., Ledingham, J.G. & Morton, J.J. (1984) Body fluid changes, thirst and drinking in man during free access to water. *Physiology & Behavior,* 33(3), p.357.

Phillips, P.A., Rolls, B.J., Ledingham, J.G.G., Forsling, M.L., Morton, J.J., Crowe, M.J. & Wollner, L. (1984) Reduced Thirst after Water Deprivation in Healthy Elderly Men. *N Engl J Med,* 311(12), p.753-759.

Pialoux, V., Mischler, I., Mounier, R., Gachon, P., Ritz, P., Coudert, J. & Fellmann, N. (2004) Effect of equilibrated hydration changes on total body water estimates by bioelectrical impedance analysis. *British Journal of Nutrition,* 91(1), p.153-159.

Poots, A. & Woodcock, T. (2012) Statistical process control for data without inherent order. *Bmc Medical Informatics and Decision Making,* 12(1), p.86-86.

Popkin, B., D'Anci, K. & Rosenberg, I. (2010) Water, hydration, and health. *Nutrition Reviews,* 68(8), p.439-458.

Popowski, L.A., Oppliger, R.A., Patrick Lambert, G., Johnson, R.F., Kim Johnson, A. & Gisolf, C.V. (2001) Blood and urinary measures of hydration status during progressive acute dehydration. *Medicine and Science in Sports and Exercise,* 33(5), p.747.

Pouyet, V., Cuvelier, G., Benattar, L. & Giboreau, A. (2015) *Influence of flavour enhancement on food liking and consumption in older adults with poor, moderate or high cognitive status*

Powell, R.A. & Single, H.M. (1996) Focus groups. *International Journal for Quality in Health Care : Journal of the International Society for Quality in Health Care / ISQua,* 8(5), p.499.

Quigley, P.A. & White, S.V. (2013) Hospital-Based Fall Program Measurement and Improvement in High Reliability Organizations. *Online Journal of Issues in Nursing,* 18(2), p.19.

Raman, A., Newman, A., Tylavsky, F., Schoeller, D., Subar, A., Troiano, R., Schatzkin, A., Harris, T., Bauer, D., Bingham, S. & Everhart, J. (2004) Water turnover in 458 American adults 40-79 yr of age. *American Journal of Physiology - Renal Physiology,* 286(2), p.394-401.

Reed, J. & Card, A. (2015) The problem with Plan-Do-Study-Act cycles. *BMJ Qual Saf,* 0, p.1-6.

Reed, J. & Payton, V.R. (1997) Focus groups: issues of analysis and interpretation. *Journal of Advanced Nursing,* 26(4), p.765-771.

Reed, J.E., McNicholas, C., Woodcock, T., Issen, L. & Bell, D. (2014) Designing quality improvement initiatives: the action effect method, a structured approach to identifying and articulating programme theory. *BMJ Quality & Safety,* 23(12), p.1040-1048.

Rehkamp, N., Davila, H., Abrahamson, K. & Arling, G. (2016) Is there a business case for nursing home quality improvement? *Nursing Economics,* 34(5), p.224.

Reid, J., Robb, E., Stone, D., Bowen, P., Baker, R., Irving, A.S. & Waller, M. (2004) Improving the monitoring and assessment of fluid balance. *Nursing Times,* 100(20), p.36.

Reimer, H. & Keller, H. (2009) Mealtimes in nursing homes: striving for person-centered care. *J Nutr Elder,* 28(4), p.327-347.

Rikkert, M.G., Melis, R.J. & Claassen, J.A. (2009) Heat waves and dehydration in the elderly. *British Medical Journal,* 339, p.b2663.

Rittig, S., Knudsen, U., Norgaard, J., Pedersen, E. & Djurhuus, J. (1989) Abnormal diurnal rhythm of plasma vasopressin and urinary output in patients woth enuresis. *American Journal of Physiology,* 256(4), p.F664-F671.

Ritz, P., Source Study & for the Source Study (2001) Bioelectrical impedance analysis estimation of water compartments in elderly diseased patients: the source study. *The Journals of Gerontology.Series A, Biological Sciences and Medical Sciences,* 56(6), p.M344-M348.

Robinson, S.B. & Rosher, R.B. (2002) Can a beverage cart help improve hydration? *Geriatric Nursing,* 23(4), p.208-211.

Robson, K., Kiely, D. & Lembo, T. (2000) Development of constipation in nursing home residents. *Diseases of the Colon & Rectum,* 43(7), p.940-943. Rodriguez, G.J., Cordina, S.M., Vazquez, G., Suri, M.F., Kirmani, J.F., Ezzeddine, M.A. & Qureshi, A.I. (2009) The hydration influence on the risk of stroke (THIRST) study. *Neurocritical Care,* 10(2), p.187-194.

Rogers, B. (1987) Ethical considerations in research. *AAOHN Journal : Official Journal of the American Association of Occupational Health Nurses,* 35(10), p.456.

Rolls, B.J., Phillips, P.A. & Phil, D. (1990) Aging and disturbances of thirst and fluid balance. *Nutrition Reviews,* 48(3), p.137-144.

Rosemond, C., Hanson, L., Ennett, S., Schenck, A. & Weiner, B. (2012) Implementing person-centered care in nursing homes. *Health Care Management Review,* 37(3), p.257-266.

Rowat, A., Smith, L., Graham, C., Lyle, D., Horsburgh, D. & Dennis, M. (2011) A pilot study to assess if urine specific gravity and urine colour charts are useful indicators of dehydration in acute stroke patients. *Journal of Advanced Nursing,* 67(9), p.1976-1983.

Royal College of Nursing & National Patient Safety Agency (2007) *Water for Health* [Online]. Available at: http://www.rcn.org.uk/__data/assets/pdf_file/0003/70374/Hydration_Toolkit_-_Entire_and_In_Order.pdf [Accessed: 20 September, 2013].

Rudaitis, S., Pundziene, B., Jievaltas, M., Uktveris, R. & Kevelaitis, E. (2009) Recurrent urinary tract infection in girls: do urodynamic, behavioral and functional abnormalities play a role? *Journal of Nephrology,* 22(6), p.766-773.

Savage, J. (2000) Participative observation: standing in the shoes of others? *Qualitative Health Research,* 10(3), p.324-339.

Scales, K. & Pilsworth, J. (2008) The importance of fluid balance in clinical practice. *Nursing Standard,* 22(47), p.50.

Schlager, T.A., Lohr, J.A. & Hendley, J.O. (1993) Antibacterial activity of the bladder mucosa. *Urological Research,* 21(5), p.313-317.

Schlegel, J.U., Cuellar, J. & O'dell, R.M. (1961) Bactericidal effect of urea. *The Journal of Urology,* 86, p.819-822.

Schols, J.M., De Groot, C.P., van der Cammen, T.J. & Olde Rikkert, M.G. (2009) Preventing and treating dehydration in the elderly during periods of illness and warm weather. *Journal of Nutrition, Health & Aging,* 13(2), p.150-157.

Shanholtzer, B. & Patterson, S. (2003) Use of bioelectrical impedance in hydration status assessment: reliability of a new tool in psychophysiology research. *International Journal of Psychophysiology,* 49(3), p.217-226.

Sheard, D. (2014) Achieving culture change: a whole organisation approach. *Nursing and Residential Care,* 16(6), p.329-332.

Sheehy, C.M., Perry, P.A. & Cromwell, S.L. (1999) Dehydration: Biological Considerations, Age-Related Changes, and Risk Factors in Older Adults. *Biological Research for Nursing,* 1(1), p.30-37.

Sheehy, C.M., Perry, P.A. & Cromwell, S.L. (1999) Dehydration: Biological Considerations, Age-Related Changes, and Risk Factors in Older Adults. *Biological Research for Nursing,* 1(1), p.30-37.

Shepherd, A. (2011) Measuring and managing fluid balance. *Nursing Times,* 107(28), p.12-16.

Shirey, M. (2012) Stakeholder Analysis and Mapping as Targeted Communication Strategy. *Journal of Nursing Administration,* 42(9), p.399-403.

Shirreffs, S.M. & Maughan, R.J. (1998) Urine osmolality and conductivity as indices of hydration status in athletes in the heat. *Medicine and Science in Sports and Exercise,* 30(11), p.1598.

Shirreffs, S.M. (2003) Markers of hydration status. *European Journal of Clinical Nutrition,* 57(S2), p.S6-S9.

Sidenvall, B., Fjellström, C. & Ek, A. (1996) *Cultural perspectives of meals expressed by patients in geriatric care.*

Simmons, S. & Schnelle, J. (2003) Implementation of Nutritional Interventions in Long-Term Care. *Alzheimer's Care Quarterly,* 4(4), p.286-296.

Simmons, S., Lam, H., Rao, G. & Schnelle, J. (2003) Family Members' Preferences for Nutrition Interventions to Improve Nursing Home Residents' Oral Food and Fluid Intake. *Journal of the American Geriatrics Society,* 51(1), p.69-74.

Simmons, S.F., Alessi, C. & Schnelle, J.F. (2001) An intervention to increase fluid intake in nursing home residents: prompting and preference compliance. *Journal of the American Geriatrics Society,* 49(7), p.926-933.

Smith, S. (2007) Clinical signs of dehydration in children. *Emergency Medicine Journal,* 24(8), p.605-605.

Smith, S.H. (1975) Nil by mouth; a descriptive study of nursing care in relation to pre-operative fasting. *Zeitschrift Fur Krankenpflege.Revue Suisse Des Infirmieres,* 68(8-9), p.246-248.

Snyder, N.A., Feigal, D.W. & Arieff, A.I. (1987) Hypernatremia in elderly patients. A heterogeneous, morbid, and iatrogenic entity. *Annals of Internal Medicine,* 107(3), p.309.

Solberg, L.I., Mosser, G. & McDonald, S. (1997) *The Three Faces of Performance Measurement: Improvement, Accountability, and Research.*

Sollanek, K.J., Kenefick, R.W., Cheuvront, S.N. & Axtell, R.S. (2011) Potential impact of a 500-mL water bolus and body mass on plasma osmolality dilution. *European Journal of Applied Physiology,* 111(9), p.1999.

Spangler, P.F., Risley, T.R. & Bilyew, D.D. (1984) The management of dehydration and incontinence in nonambulatory geriatric patients. *Journal of Applied Behavior Analysis,* 17(3), p.397-401.

Speroff, T. & O'Connor, G. (2004) Study designs for PDSA quality improvement research. *Qual Manag Health Care,* 13(1), p.17-32.

Speroff, T. & O'Connor, G.T. (2004) Study designs for PDSA quality improvement research. *Quality Management in Health Care,* 13(1), p.17.

Spigt, M.G., Kuijper, E.C., Schayck, C.P., Troost, J., Knipschild, P.G., Linssen, V.M. & Knottnerus, J.A. (2005) Increasing the daily water intake for the prophylactic treatment of headache: a pilot trial. *European Journal of Neurology,* 12(9), p.715-718.

Spilsbury, K., Hanratty, B. & McCaughan, D. (2015) *Supporting nursing in care homes* [Online]. Available at: http://www.rcnfoundation.org.uk/?a=620718&now=1429088648.

Stauffer, C., van der WEG, B., Donadini, R., Ramelli, G., Marchand, S. & Bianchetti, M. (2004) Family history and behavioral abnormalities in girls with recurrent urinary tract infections: a controlled study. *Journal of Urology,* 171(4), p.1663-1665.

Stevenson, K., Moore, J., Colwell, H. & Sleeper, B. (2005) Standardized infection surveillance in long-term care: Interfacility comparisons from a regional cohort of facilities. *Infection Control and Hospital Epidemiology,* 26(3), p.231-238.

Stewart, J. (2009) *Adding insult to injury: a review of the care of patients who died in hospital with a primary diagnosis of acute kidney injury (acute renal failure).* London: NCEPOD.

St-Onge, M.-. & Gallagher, D. (2010) Body composition changes with aging: The cause or the result of alterations in metabolic rate and macronutrient oxidation? *Nutrition,* 26(2), p.152-155.

Stratton Johnson, L. (2005) From knowledge transfer to knowledge translation: Applying research to practice. *Occupation Therapy Now*.

Strippoli, G., Craig, J., Rochtchina, E., Flood, V., Wang, J. & Mitchell, P. (2011) Fluid and nutrient intake and risk of chronic kidney disease. *Nephrology,* 16(3), p.326-334.

Su, S., Wang, J., Lu, C. & Guo, H. (2006) Reducing urinary tract infections among female clean room workers. *Journal of Women's Health,* 15(7), p.870-876.

Sudsawad, P. (2007) *Knowledge translation: Introduction to models, strategies, and measures.* Austin, TX: Southwest Educational Development Laboratory National Center for the Dissemination of Disability Research.

Sussman, S., Valente, T.W., Rohrbach, L.A., Skara, S. & Ann Pentz, M. (2006) Translation in the Health Professions: Converting Science into Action. *Evaluation & the Health Professions,* 29(1), p.7-32.

Sussman, S., Valente, T.W., Rohrbach, L.A., Skara, S. & Ann Pentz, M. (2006) Translation in the Health Professions: Converting Science into Action. *Evaluation & the Health Professions,* 29(1), p.7-32.

Sutton, D. (2013) Does hands-free drinking improve patient hydration? *Nursing Times,* 109(29), p.14-16.

Svoronos, T. & Mate, K. (2011) Evaluating large-scale health programmes at a district level in resource-limited countries. *Bulletin of World Health Organisation,* 89, p.831-837.

Szafara, K.L., Kruse, R.L., Mehr, D.R., Ribbe, M.W. & van der Steen, J.T. (2012) Mortality following nursing home-acquired lower respiratory infection: LRI severity, antibiotic treatment, and water intake. *Journal of the American Medical Directors Association,* 13(4), p.376-383.

Szczepura, A. (2008) *Improving care in residential care homes: a literature review.* York :Joseph Rowntree Foundation.

Tanco, M., Jaca, C., Viles, E., Mateo, R. & Santos, J. (2011) Healthcare teamwork best practices: lessons for industry. *The TQM Journal,* 23(6), p.598-610.

Tanuseputro, P., Chalifoux, M., Bennett, C., Gruneir, A., Bronskill, S.E., Walker, P. & Manuel, D. (2015) Hospitalization and Mortality Rates in Long-Term Care Facilities: Does For-Profit Status Matter? *Journal of the American Medical Directors Association,* 16(10), p.874.

Taplin, D. & Clark, H. (2012) *Theory of Change Basics. A primer on Theory of Change.* New York, NY: ActKnowledge.

Taylor, A.J. & Randall, C. (2007) Process mapping: enhancing the implementation of the Liverpool Care Pathway. *International Journal of Palliative Nursing,* 13(4), p.163-167.

Taylor, H.M. & Sprunt, D.H. (1943) Increased resistance to viral infection as a result of increased fluid in tissues. *The Journal of Experimental Medicine,* 78(2), p.91-97.

Taylor, M.J., McNicholas, C., Nicolay, C., Darzi, A., Bell, D. & Reed, J.E. (2014) Systematic review of the application of the plan-do-study-act method to improve quality in healthcare. *BMJ Quality & Safety,* 23(4), p.290-298.

Taylor, R. (2014) *The essentials of nursing and healthcare research.* Los Angeles: SAGE.

Tellis-Nayak, V. (2007) Cherished myths vs. stubborn facts. *Nursing Homes,* 56(1), p.22.

Thomas, D., Tariq, S., Makhdomm, S., Haddad, R. & Moinuddin, A. (2003) Physician Misdiagnosis of Dehydration in Older Adults. *Journal of the American Medical Directors Association,* 4(5), p.251-254.

Thomas, D.R., Cote, T.R., Lawhorne, L., Levenson, S.A., Rubenstein, L.Z., Smith, D.A., Stefanacci, R.G., Tangalos, E.G., Morley, J.E. & Dehydration, C. (2008) Understanding clinical dehydration and its treatment. *Journal of the American Medical Directors Association,* 9(5), p.292-301.

Thomas, J. & Harden, A. (2008) Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology,* 8(1), p.45-45.

Torres, V. (2009) Vasopressin in chronic kidney disease: an elephant in the room? *Kidney International,* 76(9), p.925-928.

Trebble, T.M., Hansi, N., Hydes, T., Smith, M.A. & Baker, M. (2010) Process mapping the patient journey: an introduction. *BMJ (Clinical Research Ed.),* 341(aug13 1), p.c4078-c4078.

Tyagi, S., Cai, X., Yang, K. & Chambers, T. (2015) Lean tools and methods to support efficient knowledge creation. *International Journal of Information Management,* 35(2), p.204-214.

Van Loan, M.D. & Mayclin, P.L. (1992) Use of multi-frequency bioelectrical impedance analysis for the estimation of extracellular fluid. *European Journal of Clinical Nutrition,* 46(2), p.117.

Visser, M., Deurenberg, P. & van Staveren, W. (1995) Multifrequency bioelectrical impedance for assessing total body water and extracellular water in elderly subjects. *Eur J Clin Nutr.,* 49, p.256-266.

Vivanti, A., Harvey, K. & Ash, S. (2010) Developing a quick and practical screen to improve the identification of poor hydration in geriatric and rehabilitative care. *Archives of Gerontology and Geriatrics,* 50(2), p.156-164.

Vivanti, A., Harvey, K., Ash, S. & Battistutta, D. (2008) Clinical assessment of dehydration in older people admitted to hospital: what are the strongest indicators? *Archives of Gerontology and Geriatrics,* 47(3), p.340.

Voyer, P., McCusker, J., Cole, M., St-Jacques, S. & Khomenko, L. (2007) Factors associated with delirium severity among older patients. *Journal of Clinical Nursing,* 16(5), p.819-831.

Voyer, P., Richard, S., Doucet, L. & Carmichael, P. (2009) Predisposing Factors Associated With Delirium Among Demented Long-Term Care Residents. *Clinical Nursing Research,* 18(2), p.153-171.

Voyer, P., Richard, S., Doucet, L., Cyr, N. & Carmichael, P.H. (2010) Examination of the multifactorial model of delirium among demented long-term care residents: P2104. *Geriatric Nursing,* 31(2), p.105-114.

Wakefield, B.J., Mentes, J., Holman, J.E. & Culp, K. (2009) Postadmission dehydration: risk factors, indicators, and outcomes. *Rehabilitation Nursing : The Official Journal of the Association of Rehabilitation Nurses,* 34(5), p.209.

Wakley, G. (2005) Questionnaires paradigms and pitfalls. *Journal of Family Planning and Reproductive Health Care,* 31(3), p.222-224.

Wallace, J. & Schwartz, R. (1997) Involuntary weight loss in elderly outpatients - Recognition, etiologies, and treatment. *Clinics in Geriatric Medicine,* 13(4), p.717-717.

Walshe, K. (2007) Understanding what works—and why—in quality improvement: the need for theory-driven evaluation. *International Journal for Quality in Health Care,* 19(2), p.57-59.

Walter-Kroker, A., Kroker, A., Mattiucci-Guehlke, M. & Glaab, T. (2011) A practical guide to bioelectrical impedance analysis using the example of chronic obstructive pulmonary disease. *Nutrition Journal,* 10(1), p.35-35.

Wang, J., Su, S. & Guo, H. (2002) Urinary Tract Infection among Clean-Room Workers. *Journal of Occupational Health,* 44(5), p.329-333.

Warren, J.L., Bacon, W.E., Harris, T., McBean, A.M., Foley, D.J. & Phillips, C. (1994) The burden and outcomes associated with dehydration among US elderly, 1991. *American Journal of Public Health,* 84(8), p.1265-1269.

Water UK (2005) *Water for healthy ageing. Hydration Best Practice Toolkit for Care Homes.* [Online]. Available at: http://www.elderabuse.org.uk/Documents/Other%20Orgs/Water%20UK%20-%20Hydration%20kit%20for%20Care%20Homes.pdf [Accessed: 12/12/2013].

Watkins, C., Lightbody, E., Theofanidis, D. & Sharma, A.K. (1997) Hydration in acute stroke: Where do we go from here? *Clinical Effectiveness in Nursing,* 1(2), p.76-83.

Weinberg, A., Minaker, K. & and the Council on Scientific Affairs, American Medical Association (1995) Dehydration: Evaluation and Management in Older Adults. *Jama,* 274(19), p.1552-1556.

Whitney, E.N. & Rolfes, S.R. (2002) *Understanding Nutrition.* 9th ed. Belmont, CA: Wadsworth/Thomas Learning.

Whyte, D. (2014) Using oral mucosa to assess for dehydration. *Nurs Times,* 110.

Wild, D. & Kydd, A. (2016) Culture change in care homes: a literature review. *Nursing Older People,* 28(7), p.35-39.

Willgerodt, M.A. (2003) Using Focus Groups to Develop Culturally Relevant Instruments. *Western Journal of Nursing Research,* 25(7), p.798-814.

Wolff, A., Stuckler, D. & McKee, M. (2015) Are patients admitted to hospitals from care homes dehydrated? A retrospective analysis of hypernatraemia and in-hospital mortality. *Journal of the Royal Society of Medicine,* 108(7):259-65.

Woodward, M. (2007) *Guidelines to effective hydration in aged care facilities.*

World Cancer Research Fund and American Institute for Cancer Research. (2007) *Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective.* Washington DC :AICR.

Yasumura, S., Cohn, S.H. & Ellis, K.J. (1983) Measurement of extracellular space by total body neutron activation. *American Journal of Physiology - Regulatory Integrative and Comparative Physiology,* 13(1), p.R36-R40.

Young, J. & Inouye, S.K. (2007) Delirium in older people. *Bmj,* 334(7598), p.842-846.

Zeegers, M., Kellen, E., Buntinx, F. & van den Brandt, P. (2004) The association between smoking, beverage consumption, diet and bladder cancer: a systematic literature review. *World Journal of Urology,* 21(6), p.392-401.

Zeman, F. (1991) *Clinical nutrition and dietetics.* 2nd ed. New York: Macmillan Publishing Company.

Zembrzuski, C.D. (1997) A three-dimensional approach to hydration of elders: administration, clinical staff, and in-service education. *Geriatric Nursing,* 18(1), p.20-26.

List of appendices

Appendix 1: Physiology of water homeostasis

The attached article entitled “Review on mechanisms, importance of homeostasis and fluid balances in the elderly” has been published in *Current Research in Nutrition and Food Science* (2016):

Review-on-mechani
sms-importance-of-ł

Appendix 2: Methods for assessing hydration status

The attached article entitled “Methods of assessment of hydration status and their usefulness in detecting in the elderly” has been published in *Current Research in Nutrition and Food Science* (2017):

Methods-of-assess
ment-of-hydration-s

Appendix 3: Ethics decision

UNIVERSITY OF
WEST LONDON

College of Nursing, Midwifery and Healthcare
Research Scrutiny & Ethics Sub-committee
Paragon House
Boston Manor Road
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Tel: +44 (0)20 8209 4110/4145
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Ms Agnieszka Bak
c/o Richard Wells Research Centre
College of Nursing Midwifery and Healthcare
University of West London

12 June 2013

Dear Agnieszka

Re: Application for Ethical Approval No. CRSESC15

Thank you for sending in your application for approval. The Committee has considered this and approved the research without major amendment.

If the research does not progress, or if you make any changes to your research proposal or methodology can you please inform the Committee in writing as this may entail the need for additional review. It is your responsibility, as the principal investigator, to submit a report on the progress/completion of the research twelve months from the date of this letter, or on completion of the research, whichever is the sooner. Please find attached a blank report form to be completed by June 2014.

The Committee wish you well with the research and look forward to your report.

Yours sincerely

Sharon Elliott
On behalf of the College Research Scrutiny & Ethics Sub-committee

Appendix 4: Data collection tools used in exploratory phase

Dehydration Research: Focus Group Topic Guide

Introduction

Who we are + CLAHRC

- About myself
- About CLAHRC
- Service improvement in Bluebell as part of the fellowship
- Service improvement on another unit as part of the bigger project

Purpose of meeting today

- To understand how hydration is managed for residents here.
- To hear your views and learn/understand from you:
    - strategies you use to meet hydration needs
    - what you think makes these successful
    - what do you see as the challenges/barriers

I welcome your views

Will record if OK with you so we can keep a good record of what we discussed

Details will be anonymised and you will see what we write

Confidential – I want you to discuss honestly what does and does not happen so I can understand the problems and look at how to solve them

Any questions?

1. **Can you tell me about your daily routine?**
    - What do you do every day? (seek responses from different staff groups)
    - How (and if) you contribute to fluid provision? (seek responses from different staff groups)
    - What happens to different groups of residents (e.g. those staying in their rooms for a whole day or refusing to participate in activities)?
    - What happens in unusual circumstances (e.g. resident going for hospital appointment)?

2. **How important do you think hydration is?**
    - How important is it comparing to other tasks?
    - How do you know if residents drink sufficient amounts (not too little, not too much)?

- Do you think it is a problem in the elderly?
    - Why do you think this is?
    - How prevalent is this problem?
- Do you think you are confident enough to recognise people at risk factors or signs and symptoms of dehydration?
- Are you aware of consequences of dehydration?
    - Discuss UTI if mentioned

3. **How would you know if anybody has any special requirements related to their conditions?**
    - Are you aware of any specific requirements of your residents?
    - Do you feel that people making decisions about special requirements communicate this information with you effectively?
    - How are they communicated within the care home/team?

4. **How do you think different tasks are prioritised by different people?**
    - E.g. managers, head office, residents, families, doctors, others?
    - Where does hydration fit compared to other tasks (e.g. less/more important)?
    - Are there any people that are particularly focused on hydration?
    - Do you think you get enough support from your employers/healthcare professionals to provide adequate hydration help?

5. **What are the strategies in the home to ensure appropriate hydration?**
    - Assessment and monitoring
    - Particular interventions
    - Different types of fluids/equipment

6. **Can you identify any barriers/challenges to optimal fluid provision?**
    - For the members of staff
    - For the residents themselves

7. **After describing routines, strategies and barriers; what do you think works?**
    - What doesn't work and why?
    - What would you do differently?
    - Involvement of other people (families, residents, other staff members)

8. **Is there anything you would like to add?**

Information sheet and consent form:

I am a PhD student based in the University of West London. My focus of research is optimising hydration in the elderly.

This is a very important issue as it has been recognised that due to physiological and environmental factors, the elderly are very vulnerable to developing dehydration. Links have been made between dehydration and a wide range of health-related problems such as confusion, falls, constipation, urinary tract infections, increased hospital admissions as well as increased risk of death.

The aim of my current research is to determine how hydration is managed in the care homes and what the difficulties are. The exercise will help identify both the barriers to provision of adequate fluids, as well as successful strategies to optimise the fluid intake. This work will inform a design of subsequent studies to implement effective actions to support hydration needs of the elderly in the care homes. This will be achieved using a *service improvement* methodology, which means that I will be working closely with staff, residents and their carers to help design and test the methods of improving hydration.

The research will comprise of the following components:

1. Preparation of *process map*, a pictorial model of current routine practices of hydration care for the residents. This will be accomplished by a series of:
    - Observations of daily routines and fluid/food consumption patterns of the residents;
    - Focus groups with staff to talk about how they approach hydration and what the barriers are;
    - Interviews with residents and the families to explore their perceptions to hydration
    - A onehour session with staff/residents/family to prepare the map supported by feedback from all the above
2. Identifying priorities and activities to be undertaken to improve hydration by designing *action-effect diagram*, based on the findings of the process map
3. Testing these activities on a small scale and evaluating them before they are implemented across the home using a service improvement tool known as *Plan-Do-Study-Act cycle*

If you wish to obtain further information about any aspect of this research, you can contact me via e-mail (aggie.bak@uwl.ac.uk).

If you are concerned with how this research is conducted please contact my PhD supervisor: Prof Heather Loveday (heather.loveday@uwl.ac.uk).

Consent Form

Project: Improving hydration in care home residents

Principal investigator: Aggie Bak, University of West London

☐ I confirm that I understand what this focus group/interview is about and I had an opportunity to ask questions

☐ I understand that my response may be recorded

☐ I understand that my details and responses provided will remain confidential

☐ I understand that my participation is voluntary

Participant name _____

Participant signature _____ Date: _____

Unit level interview with unit manager and/or staff

Formal drinking opportunities	**What**	**When**	**Where**	**Who**	**How**
Breakfast					
Lunch					
Dinner					
Afternoon tea					
Afternoon in café					
Morning in café					
Evening snacks and drinks					
Drinks with medication					
Other drinking opportunities	**What**	**When**	**Where**	**Who**	**How**
Giving drinks whenever the residents request					
Drinks with activities					

Responsibilities	
What time are the meals served?	
Who is responsible for individual resident's food and drink intakes?	
Who is responsible for documenting food and fluid intakes?	
How are residents allocated to a particular staff member?	
How many residents are assigned to each staff member?	
Are staff members responsible only for formal drinking opportunities of the resident?	
Is there anybody else giving drinks to residents?	
Can residents/family access the fluids at all times?	
What is a method of communication if	

someone else gives a resident a drink?	
How do you decide who needs to be on fluid/food charts?	
What happens to the old nursing notes? Who takes them? Where are they kept?	
Who reviews the food/fluid charts and decides if residents eat/drink enough?	
How do you decide if somebody needs to be referred to a specialist?	
Who is responsible for making the nourishing drinks recommended by dietician?	
What do you do different for people with diabetes?	
What happens if the resident has two or more needs/ preferences?	
Assessment of needs and preferences	
How are needs/preferences established for residents when they first come to the home?	
Where are these needs/ preferences documented for each resident?	
How are these needs/ preferences communicated with the staff members?	
How are these needs/ preferences communicated with kitchen staff?	
What happens if need is identified but the home has no means to support it?	

What happens if the preference is identified but this is not available in a home?	
How are orders for mealtimes taken?	
How do you know who goes where for mealtimes/ activities?	
What happens when a new need/preference is observed by staff or anybody else?	
What happens when the needs/preferences change?	
How do you know when that happens?	
How often do residents get reassessed?	
What happens to documentation after reassessment?	
How are these changes communicated to other staff members in the unit?	
Communication	
How often are the handovers held?	
How long do the handovers last?	
What is discussed at handovers?	
Who participates in handovers?	
Are the handovers written? Are copies stored long-term?	
How are short-term problems communicated?	
Are short-term problems written anywhere?	
Who is responsible for writing this?	
How do you make orders for the	

mealtimes? Who? When?	
Is this done for all three meals?	
How do you know what the residents need?	
New staff members/agency staff	
How are residents' needs/ preferences communicated with new/agency staff?	
Is the information about residents' needs/ preferences easily available for reference?	
Is there a way for new/agency staff members to recognise residents?	
Special circumstances	
What happens if a resident goes out for a day, e.g. doctor's appointment?	
What happens if residents go out for a day as part of the activities?	
What happens if the families take a resident out for a day?	
What happens on special occasions, e.g. birthdays? Who communicates it?	
Anything to add?	
Unit level interview with catering manager	
Fluid types available	
Hot drinks	
Cold drinks	
Fruit, desserts	
Fluids from foods	
Equipment available for special needs	
Special cups	
Special plates	
Special cutlery	
Straws	

Other	
Equipment available for providing drinks	
What are the types of cups/glasses available?	
Jugs, tea kettles etc.	
Blenders	
Measuring jugs	
Accessories to peel/cut fruit	
Other	
Needs and preferences	
How are preferences communicated to the kitchen staff?	
How are the allergies/food intolerances communicated with kitchen staff?	
How do you receive the orders for the mealtimes?	
How do you cater for people with special needs/ preferences?	
What happens if the resident has two or more needs/ preferences?	
How are the meals planned to take the above into consideration?	
What happens if preferred food/drink is not usually available?	
What happens on special occasions, e.g. Christmas or birthdays?	
Who is responsible for communicating special occasions with the kitchen?	
Who is responsible for making the nourishing drinks recommended by dietician?	
Deliveries	
How often are food/fluids ordered?	
What is the wait for food delivery?	

How often is food delivered?	
Who is responsible for food/fluid orders?	
Who is responsible for crockery/cutlery/equipment orders?	
Who makes decisions about ordering these?	
Distribution	
How are drinks distributed throughout the units? Who is responsible?	
How often does this happen?	
How do you decide how much food to send to the units?	
How do you know how much of each drink to send to the units?	
Who is responsible for ensuring meals are taken to the units?	
How are glasses/cups distributed throughout the units?	
Who is responsible for ensuring crockery/cutlery are taken to the units?	
Who is responsible for bringing crockery/cutlery leftovers from mealtimes up?	
What happens if somebody has their own cup, plate etc.?	
Unit level interview with Activity coordinator	
Activities	
Where are activities held?	
When and how often are they held?	
Who participates in activities? How are the residents chosen?	

Examples of activities held	
Do any staff members help with activities?	
Do you provide any activities that are specifically focused on hydration?	
Fluids available	
How do you ensure residents drink during activities?	
What are the drinks available?	
How do you obtain the drinks for activities? Who is responsible for bringing them?	
How do you obtain the crockery and other equipment for drinks?	
Communication	
How do you know what the residents like to drink?	
How do you know who has special needs e.g. thickened fluids, restriction, diabetic?	
How do you document what drinks have been given to particular residents?	
Fluid/food orders	
How are foods/fluids ordered?	
How do you know how much to order?	
Do you order any special drinks/foods normally not available on a menu?	
Help with fluids	
How do you know who needs help with eating/drinking?	
Are activity coordinators trained in feeding?	

Special occasions	
Birthdays: are you responsible for organising anything?	
Days out: how is fluid provided?	
Café	
How is clean crockery delivered to the café?	
How are drinks/supplies delivered to café?	
Own cups?	

Resident fluid preferences

Resident code:

Questions for resident (*or the family/friends if communicating with resident is not possible*)	
What do you usually like to drink?	
Do you like different drinks at different times of the day e.g. with meals or in the evening?	
Do you like different drinks at different times of the year e.g. cold drinks in summer and hot drinks in winter?	
Would you prefer your drinks to be served before, with or after the meal? Different types at different stages?	
Do you like different drinks on special occasion e.g. birthdays or Christmas?	
Do you like having a drink at certain times of the day?	
Is the quality of the drink important to you e.g. temperature, texture, sweetness etc.?	
Are there any types of drinks that you don't enjoy?	
Do you like your drinks in certain type of glass or cup e.g. beaker or your own mug? Do you like other aids such as straws?	
Do you like any foods that are rich in fluid e.g. yoghurt, ice cream, fruit, jelly, custard?	
Have your drinking habits changed since you came to the home e.g. type of the drinks, times, frequency etc.?	
Do you enjoy drinking? Are you worried about drinking too much e.g. not being able to go to toilet on time?	

Between meals observations

Date:	Unit code:	Location:
Time in:	Time out:	Staff type/no scheduled for the shift:

1. Activity	
1.1 What are the number/type of staff present?	1.2 How many residents are present?
1.3 Are there any other people present (e.g. family)? If so, what are they doing?	1.4 Are there any structured activities running? If so, what are the activities?
1.5 What are the residents doing?	1.6 What are the staff doing?
1.7 Additional comments	
2. Fluid availability	
2.1 What types of fluid are available? How are they distributed?	2.2 How are drinks made accessible to residents (e.g. visible, within reach, light cups, lids off etc.)
2.3 Have any drinks been prepared in advance?	2.4 What are the supplies available (e.g. thickeners, sugar, sweeteners)?
2.4 What are the foods rich in fluids available (e.g. jelly, fruit etc.)?	2.5 What are the drinks/foods given to the residents?
2.6 How many residents have drinks in front of them?	2.7 Do residents have any food/fluid items not provided by the care home?
Additional comments	
3. Equipment availability	
3.1 What are the number/type of glasses and crockery available?	3.2 What are the number/type of other equipment available (e.g. jugs, plates, bowls and cutlery)?
3.3 What are the types of special equipment available (e.g. beakers, straws etc.)?	3.4 What is the type of electrical equipment available (e.g. blenders, kettles, coffee makers, water fountain)?
3.5 Additional comments	
4. Help with fluids	
4.1 Have the residents been offered any drinks? How are they asked for fluid preferences?	4.2 How are special requirements and preferences communicated?
4.3 How are the drinks prepared and served?	4.4 How are the residents assisted/ prompted with drinking?
4.5 Have additional drinks been offered? How are they refilled?	4.6 How are the fluid intakes documented?

4.7 Additional comments	
5. Other activities	
5.1 Have there been any food/fluid deliveries to the location? What time? Who delivered them? How were they stored/utilised?	**5.2 How are clean cups/glasses obtained? What happens to the dirty cups/glasses etc. When are they removed/washed? Who does it?**
5.3 Additional comments	

Mealtime observations

Date:	Unit code:	Location:	Meal:
Time in:	Time out:	Staff type/no scheduled for the shift:	

1. Preparation for the meal

1.1 What is the general environment, e.g. music or TV, cleanness of the room, temperature?	1.2 How are the tables set up (what are the seating arrangement, table clothes etc.)?
1.3 What time did the residents start to arrive? How many residents arrived before food arrived? Who brought the residents?	1.4 How were the residents prepared for the meal (e.g. well positioned, toileted, hands washed, bibs etc.)? What is the routine?
1.5 What were residents doing before the food arrived?	1.6 What were staff doing before the food arrived?
1.7 What drinks have been prepared? Where are they kept?	1.8 What drinks have been given before the meal? How were they distributed?
1.9 Additional comments	

2. Serving the meal

2.1 What time was food delivered to dining room?	2.2 Who brought the food to the dining room?	2.3 What time was the first meal served?
2.4 What time was crockery delivered to dining room?	2.5 Who brought the crockery to the dining room?	2.6 What time was the last meal served?

2.7 What are the number/type of staff present?	2.8 What are the fluid rich food items on the menu?
2.9 How are the residents asked for preferences?	2.10 How are special diets or preferences communicated?
2.11 How is the food dished up/served?	2.12 What drinks are served with the meal? How are they delivered? Are there any residents missing drinks?
2.13 What order is the food distributed to individual residents?	2.14 What are staff doing if not serving food or feeding?
2.15 Additional comments	

3. Consumption of the meal

3.1 How are the residents assisted/prompted with eating and drinking?	3.2 Are residents asked about/given more drinks? How are they distributed?

3.3 How are drinks made accessible to residents (e.g. visible, within their reach, light cups, lids off etc.)?	**3.4 Are there any family members helping with feeding/drinking? Have they brought any own food/drink?**
3.5 What are staff doing during the meal consumption?	**3.6 What are the foods and fluids given/consumed?**
3.7 How many staff arrived after the meal started or left before the meal finished? What was the reason?	**3.8 How many residents arrived after the meal started? What was the reason?**
3.9 Additional comments	

4. After the meal

4.1 What time was the last person finished? Were all residents given enough time to finish their meal?	**4.2 How have the hygiene needs met after the meal (e.g. bibs taken off, mouths wiped, clothes changed)?**
4.3 What drinks were offered after the meal? Where? How were they distributed?	**4.4 What are the residents doing after the meal?**
4.5 What are staff doing after the meal?	**4.6 How was food/fluid intake documented?**
4.7 Additional comments	

Individual observations

1. Resident profile

1.1 Care home code:	1.2 Resident code:	1.3 Gender:

1.4 Does the resident appear to have a physical impairment?

☐ No impairment

☐ Mobile with assistance, able to drink independently

☐ Chair/bed bound but able to drink independently

☐ Fully dependent

☐ Not sure

1.5 Does the resident appear to have a mental impairment?

☐ Yes

☐ No

☐ Not sure

1.6 Which category does the resident seem to fit? (resident may fit into more than one category)

☐ No hydration issues

☐ Can drink

- ☐ *Independent*
- ☐ *Forgets*

☐ Can't Drink

- ☐ *Dysphagic*
- ☐ *Physically dependent*

☐ Won't drink

- ☐ *Sipper*
- ☐ *Fears Incontinence*

☐ End of life

2. Fluids offered: breakfast and mid-morning

2.1 Date	2.2 Time in:	2.3 Time out:	2.4 Staff type/no scheduled for the shift:

Time	Was this a meal time?	Type	Staff	Volume offered	Location	Was assistance provided? If yes, describe	Volume consumed	Comments (including reasons for not consuming the whole amount)

2.5 Fluids offered (ml):	2.6 Fluids consumed (ml):	2.7 Fluids recorded (ml):

3. Fluids offered: lunch and mid-afternoon

3.1 Date	3.2 Time in:	3.3 Time out:	3.4 Staff type/no scheduled for the shift:

Time	Was this a meal time?	Type	Staff	Volume offered	Location	Was assistance provided? If yes, describe	Volume consumed	Comments (including reasons for not consuming the whole amount)

3.5 Fluids offered (ml):	3.6 Fluids consumed (ml):	3.7 Fluids recorded (ml):

4. Fluids offered: dinner and early evening

4.1 Date	4.2 Time in:	4.3 Time out:	4.4 Staff type/no scheduled for the shift:

Time	Was this a meal time?	Type	Staff	Volume offered	Location	Was assistance provided? If yes, describe	Volume consumed	Comments (including reasons for not consuming the whole amount)

4.5 Fluids offered (ml):	4.6 Fluids consumed (ml):	4.7 Fluids recorded (ml):

5. Fluids offered: night time

5.1 Date	5.2 Time in:	5.3 Time out:	5.4 Staff type/no scheduled for the shift:

Time	Was this a meal time?	Type	Staff	Volume offered	Location	Was assistance provided? If yes, describe	Volume consumed	Comments (including reasons for not consuming the whole amount)

5.5 Fluids offered (ml):	5.6 Fluids consumed (ml):	5.7 Fluids recorded (ml):

6. Resident's records

6.1 Fluids recorded recently			6.2 Continence		6.2 Resident's weight and height
☐	☐	☐	☐Continent		☐_____ kg
☐	☐	☐	☐Incontinent of urine	☐ Always	☐_____ cm
☐	☐	☐	☐Incontinent of faeces	☐ Sometimes	

6.3 Evidence of requirements and preferences documented in care plans (include assistance required, referrals to specialists and recommendations)

6.4 Evidence of requirements and preferences communicated (include nursing notes and information sheets in own room/kitchenette, kitchen etc):

6.5 Additional comments if observed:

6.6 Recommendations (include target fluid intake and compare to fluids consumed):

I-Hydrate Generic Observation Schedule

Date:	Unit:	Location in unit:
Start time:	Stop time:	Number and type of Staff scheduled for the shift:
Period of observation: ☐ Breakfast ☐ Early morning ☐ Lunch ☐ Mid-morning ☐ Dinner ☐ Mid-afternoon ☐ Evening	Is this a structured activity? *If yes, provide details:*	General environment • Noise, clutter, smell • Tables/equipment ready (e.g. seating; tablecloths; crockery; drinks)

1. Fluid provision

What drinks and supplies are available on the tables/in the room/in the kitchenette?	*Are thickeners, sugar, etc. available?*
What drinking aids are available in the room/in the kitchenette?	*Are special cups, beakers, straws etc. available?*
Are any visitors present?	*What are they doing? Are they assisting with food/fluid? Whom do they help?*
How many staff are present?	*What type? What are they doing? Do they stay in the same room all the time?*
Comment on general efficiency and effectiveness of fluid provision observed	*e.g. toileting/washing during mealtimes, residents/staff not ready, how distributed, time taken, equipment/supplies missing*

2. Residents

Resident	Drink given (pre-observation)	Drinks given			Fluid rich foods given	Asked for preferences	Requirements met	Assistance given	Comments (*including unfinished drinks and missed opportunities*)
		1st drink	*2nd drink*	*3rd drink*					

Was any fluid intake documented?	*If so how is this done?*

Individual observations

Date:	Unit:	Location in unit:
Start time:	Stop time:	Number and type of staff scheduled for the shift:

1. Resident profile

Resident code:	Gender:	Weight:	Height:

Does the resident appear to have any impairment?

☐ No impairment ☐ Mobile with assistance, able to drink independently ☐ Chair bed/bound but able to drink independently

☐ Fully dependent ☐ Cognitive impairment ☐ Not sure

Evidence of requirements and preferences documented in care plans (include assistance required, referrals to specialists and recommendations)

Evidence of requirements and preferences communicated (include nursing notes and information sheets in room, kitchen etc.)

Recent fluid chart records

☐ Date_____ Total volume_____ ☐ Date_____ Total volume_____ ☐ Date_____ Total volume_____

☐ Date_____ Total volume_____ ☐ Date_____ Total volume_____ ☐ Date_____ Total volume_____

2. Fluids offered

Time	Was this a meal time?	Type of fluid	Staff type offering	Volume offered	Volume consumed	Comments (including reasons for not consuming the whole amount)

3. Fluids recorded (check records at the end of observation as well as next day)

Time/date records inspected	Time recorded	Type recorded	Volume recorded	Additional comments

Appendix 5: An example of the four-week menu available in a care home. The menu was revised twice a year to allow for seasonal changes

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
BREAKFAST	Full English breakfast	Kippers and full English breakfast	Scrambled eggs full English breakfast	Full English breakfast	Kippers and Full English breakfast	Full English breakfast	Scrambled eggs full English breakfast
MID MORNING	Sponge cake	Profiler roles with chocolate spread	Treacle roly poly slices	Selection of biscuits	Banana cake	Mini croissants	Juicy swirl
LUNCH	Meat balls in tomato sauce Or Qourn casserole with boiled potato and baby carrots +steam courgette Apple crumble and custard	Fisherman pie Or Veg casserole with creamed potatoes and green beans + butternut squash cheese cake	Rice and peas Or cheese and onion quiche with French fried chicken and braised cabbage +baby corn Rice pudding	Brown stew lamb Or Veg hotpot and green beans + steam beetroot Creamy semolina	Battered cod Or Veg spring roll with French fries and mushy Peas + sweet corn Eves pudding and custard	Beef and onion pie Or Leak and potato with pie Creamed potato, broccoli and cauliflower Tapioca and jam	Roast pork with sauce Or vegetable flan with roast potato Baby carrots and cabbage Fruit crumble and custard
MID AFTERNOON	Biscuits and cheese	Lemon cake	Milk cookies	Ring doughnuts	Custard tart	Blueberry muffins	Sultana scones
SUPPER	Tomato soup Sandwiches Veg lasagne with coleslaw	Mushroom Soup selection of sandwiches jacket potato and beans or choice of filling	Chicken soup Selection of sandwiches Tuna paste bake With Veg spring rolls	Lentil soup Selection of sandwiches Sardines and toast	Veg soup Selection of sandwiches And toast	Oxtail soup Selection of sandwiches Spaghetti Bolognese Mixed beans salad	Leek soup Selection of sandwiches Fish finger & coleslaw
EVENING	Fruit salad	Trifle	Vanilla ice cream	Tangerine	Chocolate mouse	Strawberry jelly and cream	Thick creamy yogurt

MENU – WEEK 3

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
BREAKFAST	Full English breakfast	Full English breakfast	Scrambled eggs full English breakfast	Full English breakfast	Full English breakfast	Full English breakfast	Scrambled eggs full English breakfast
MID MORNING	Sultana scones	Juicy swirl	Blueberry muffin	Milk cookies	Selection of biscuits	Treacle roly poly	Chocolate sponge
LUNCH	Rice & peas Cheese & onion quinche With fried chicken and green beans & butternut squash apple pie custard	Meat balls Or Veg pie with seasoned wedges and baby carrots & beetroot rice pudding with jam	Sausage in gravy Or Quorn casserole with boiled potato and buttered cauliflower & steam courgette apple crumble and custard	Curried beef Stew Or veg curry with steamed basmati rice and broccoli & dice Swede strawberry cheesecake	Battered fish with lemon Or Veg spring rolls with French fries and garden peas + sweet corn Creamy semolina	Pork casserole cheese Or tomato quinche Mashed potato and baby sweet corn + butternut squash Rhubarb crumble	Roast chicken Or Veg pasta bake with roast potato and buttered carrots + Brussels sprout strawberry jelly and cream
MID AFTERNOON	Sponge cake	Biscuits & cheese	Custard tart	Chocolate éclair	Lemon cake	Sweet finger rolls	Mini croissants
SUPPER	Mushroom soup Selection of sandwiches Tuna pasta bake with green salad	Oxtail soup Selection of sandwiches Cauliflower cheese with crispy bacon	Veg soup Selection of sandwiches Spaghetti Bolognese	Lentil soup Selection of sandwiches Corn beef hash with cos lettuce	Minestrone Selection of sandwiches Macaroni cheese with pork pie	Chicken soup Selection of sandwiches Cheese & onion pasty and scotch egg	Tomato soup Selection of sandwiches Sausage rolls baked beans
EVENING	Cream caramel	Strawberry angel delight	Jelly and cream	Fresh fruit salad	Baked apple and custard	Tangerine and cream	Trifle

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
BREAKFAST	Full English breakfast	Kippers and full English breakfast	Scrambled eggs full English breakfast	Full English breakfast	Kippers and Full English breakfast	Full English breakfast	Scrambled eggs full English breakfast
MID MORNING	Blueberry muffin	Mini ring doughnuts	Custard tart	Treacle roly poly slices	Sweet finger roll	Current tea cakes	Selection of biscuits
LUNCH	Chicken korma Or Quorn casserole With Steamed rice and cabbage semolina + baby corn	Stew beef & dumpling Or Veg casserole With Mashed potatoes and Brussels sprout spotty dick with custard + beet root	Sweet & sour pork Or Leak and potato pie With Boiled potato and sliced carrots pineapple upside down cake and custard + steam courgette	Rice & peas Or Veg curry With Bake chicken broccoli + cauliflower creamy tapioca and jam	Battered cod Or Veg sausages With chipped potato mushy peas and grilled tomatoes poached pears and custard	Lamb hotpot Or Cheese and mushroom quinche With Mash potato and green beans + butternut squash Strawberry cheese cake	Roast beef Or Veg burgers with Yorkshire pudding Creamed potato and steamed cabbage + dice Swede Apple stew and custard
MID AFTERNOON	Fresh fruit cake	Milk cookies	Sultana scones	Biscuits and cheese	Chocolate éclairs	Juicy swirl	Carrot cake slices
SUPPER	Lentil soup sandwiches Fish fingers With Baked beans and toast	Veg soup of selection of sandwiches Chicken nuggets With Beetroot salad	Tomato soup Selection of sandwiches Macaroni cheese Mixed salad	Mushroom soup Selection of sandwiches Jacket potatoes with tuna & cheese melt and baked beans	Chicken soup Selection of sandwiches Hotdogs with buns and mustard sauce or tomato ketchup	Leek soup Selection of sandwiches Vegetable ravioli and toast	Oxtail soup Selection of sandwiches Corn beef hash and coleslaw
EVENING	Bread pudding	Banana angel delight	Fruit salad	Trifle	Tangerine +cream	Baked apple with custard	Cream caramel

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
BREAKFAST	Full English breakfast	Full English breakfast	Scrambled eggs full English breakfast	Full English breakfast	Full English breakfast	Full English breakfast	Scrambled eggs full English breakfast
MID MORNING	Blueberry muffin	Juicy swirl	Mini cupcakes	Cream scones	Lemon cakes	Mini croissants	Selection of biscuits
LUNCH	Curried beef stew Or Veg curry With Steamed rice & broccoli Stewed plum & custard	[redacted] chicken Or Veg sausage With Roast potato and braised cabbage Fruit crumble and custard	Shepherds pie Or Veg pie With Seasoned wedges and baby carrots Rice pudding with jam	Pork casserole Or Cheese & tomato quinche Mashed potato and baby corn Eves pudding with custard	Battered cod Or Veg burger With French fries And garden peas Creamy semolina	Chicken and mushroom pie Or Veg flan With mashed potato and mixed veg Tapioca and jam	Roast lamb Or Qourn casserole With roast potato and Brussels sprout Banana and custard
MID AFTERNOON	Sweet finger rolls	Treacle roly poly	Milk cookies	Custard tart	Biscuits and cheese	Ring doughnuts	Currant tea cakes
SUPPER	Leek soup Selection of sandwiches Macaroni cheese Potato salad	Oxtail soup Selection of sandwiches Chicken nuggets With mixed salad	Miner stone soup Selection of sandwiches Stir fry chow mien With Veg and fishcake	Chicken soup Selection of sandwiches Scrambled eggs and toast And Vegetarian spring rolls	Lentil soup Selection of sandwiches Corn beef hash and Green salad	Tomato soup Selection of sandwiches And Veg lasagne	Veg soup Selection of sandwiches Sausage rolls & bake beans
EVENING	Cream caramel	Chocolate mousse	Trifle	Banana angel delight	Bread pudding	Tangerine and cream	Fresh fruit salad

MENU - WEEK 4

Appendix 6: Process Maps

1: Generic map types of drinks observed to be offered at different locations throughout the day:

drinks given throughout the day

2: Between meals process map:

between meals process map.pdf

3: Between meals map: the ideal process:

ideal between meals process map.p

4: Mealtime process map:

real mealtime drink provision.pdf

5: Mealtime map: the ideal process

ideal mealtime drink provision.pdf

Appendix 7: PDSA template

I-Hydrate Plan-Do-Study-Act

PDSA title: ☐ New PDSA ☐ Linked to a previous PDSA (title:_____)

Plan:

What are we going to do?	Person responsible	When to be done?	Where to be done?	How long?

What prompted this change?

Who are we going to involve?

☐ Staff? If yes, who? _____

☐ Residents? If yes, who? _____

☐ Anybody else? If yes, who? _____

How long will the change be tested?

How will the impact of the change be measured?

☐ routinely collected I-hydrate measures _____

☐ one-off measures _____

☐ staff feedback _____

☐ resident feedback _____

☐ other _____

Predict what will happen when the change is carried out

What will improve?	What could go wrong?

Who will assess what happened?	Date/time to assess this

What preparation is needed before the change is tested	Person responsible	When to be done?	Where to be done?	How long?

Date/time of the meeting to review this PDSA:_____

Do:

Date of the test: _____ Did the test go as planned? ☐ Yes ☐ No

If not, describe what actually happened – was the test carried out as planned?	
Report on collected measures	**Did anything else happen?**

Study:

Describe how the results compared with prediction	How did this compare to previous cycle (if linked)?
What was learnt?	**How could this be done better?**

Act:

What is the next step?		
☐ adapt/develop this PDSA	☐ test this PDSA for longer	☐ test this PDSA on more people
☐ introduce this as daily routine	☐ stop this PDSA	☐ other _____
Describe what will happen next		

Appendix 8: Hydration posters displayed on units in care home

Helping to hydrate older people

The minimum amount people should drink is 1500ml per day.

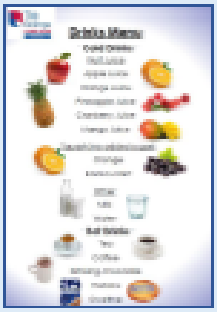
This is around 8 - 10 glasses or cups.

Many older people do not realise that they are thirsty, and may need to be encouraged or assisted to drink. This may mean:

- Offering them a suitable cup or a straw
- Waking them up, or reminding them to drink
- Positioning them so they are able to drink comfortably
- Holding the cup for them or putting the cup in their hands

Everyone has their own drinks preferences...

- Use the drinks menu to provide drink choice
- Offer drinks regularly throughout the day
- Offer both a hot and cold drink



Some foods are also a good source of fluid such as:

- Custard, gravy, ice cream, jelly, cream, fruit, yogurt, porridge, soup

Opportunities for Offering Drinks

For residents to drink **at least 1500ml a day** drinks need to be offered frequently throughout the day.

6 – 8am Early Morning	Offer a hot and/or cold drink
8 – 10.30am Breakfast	Offer a hot and/or cold drink Remember to offer drink refills
10.30 – 12pm Mid-morning	Offer a hot and/or cold drink
12 – 3pm Lunchtime	Offer a hot and/or cold drink with lunch Offer fluid-rich desserts (e.g. custard)
3 - 5pm Mid-afternoon	Protected Drinks Time Try to serve a hot and a cold drink
5 – 7pm Dinnertime	Offer a hot and/or cold drink with dinner Offer soup and fluid-rich desserts
7 – 10pm Bedtime	Offer a drink before the resident is too tired or sleepy

Remember to offer refills of drinks throughout the day

Appendix 9: Drinks Menu

Appendix 10: Refreshment Needs Guides

Refreshment needs

Template no assistance

Last updated: Oct 2016

- **My diet is**:
- **Allergies/Intolerances**:

I need your help with:

- **My cup preferences**:

- **I usually prefer….**

- **I tend not to like…..**

“Refreshment needs“ guides are here!

What does it mean?

The guides will help the staff to quickly check residents’ needs and preferences for food and drink

Check out the colour coding:

Refreshment needs

John

Last updated: Aug 2016

- My diet is: *Normal diet & fluids*
- Allergies/Intolerances: *Diabetic*

I need your help with:

I am able to eat & drink independently
I especially like lots of tea

- My cup preferences:

Standard mugs and glasses

- I usually prefer....

Milky Tea, no sugar
Fresh juice (all types)
Soup
Sandwiches

- I tend not to like.....

Yoghurt
Semolina

No assistance is required

Check for resident’s likes and dislikes as well as allergies and intolerances

Refreshment needs

Doris

Last updated: Aug 2016

- My diet is: *Normal diet & fluids*
- Allergies/Intolerances: *None known*

I need your help with:

I like someone to sit and talk to me when I have a drink - it makes me calm and stops me pouring my drink on the floor.
I eat and drink better if I am not in bed.

- My cup preferences:

Lightweight mug for hot drinks
Plastic cup for cold drinks

- I usually prefer....

Tea with 2 sugrs
Mango juice
Cranberry juice
Orange juice

- I tend not to like.....

Figgy drinks
Water
Squash
Coffee

Prompting or encouragement is required

Check for resident’s needs, likes and dislikes as well as allergies and intolerances

Refreshment needs

Mary

Last updated: Aug 2016

- My diet is: *Vegeturian diet, normal fluids*
- Allergies/Intolerances: *None known*

I need your help with:

I need help to eat but can drink by myself

- My cup preferences:

My own two-handed beaker

- I usually prefer....

Milky tea with 1 sugar
Orange juice
Water
Fresh fruit - clementines, satsumas, grapes,
Jelly / Ice cream

- I tend not to like.....

Fizzy drinks
Puddings

Assistance with eating or drinking is required

Check for resident’s needs, likes and dislikes as well as allergies and intolerances

Appendix 11: Scores of the tested drinking vessels

Type of vessel	No of tests	Resident ratings: median score (min-max)					Volume (ml)	Weight (g)	Weight with fluid (g)
		Handling	Volume	Feel	Appearance	Total score‡			
Cups and mugs									
Standard cup	*179*	*3 (1-5)*	*3 (1-5)*	*5 (1-5)*	*3 (1-5)*	*14 (5-18)*	*150*	*245**	*395**
Test mug 1	9	5 (5-5)	3 (2-5)	5 (3-5)	4 (3-5)	16 (13-18)	250	225	476
Test mug 2	10	5 (2-5)	3 (2-5)	5 (3-5)	4 (2-5)	15 (13-17)	250	228	453
Test mug 3	10	5 (2-5)	3 (3-4)	4 (2-5)	4 (1-5)	15 (10-18)	275	272	534
Test mug 4	10	3 (2-5)	3 (3-4)	4 (2-5)	4 (3-5)	15 (10-18)	300	296	575
Test mug 5	10	3 (2-5)	3 (3-5)	4 (2-5)	5 (1-5)	15 (9-18)	275	250	511
Test mug 6	7	4 (1-5)	4 (1-5)	5 (2-5)	4 (1-5)	14 (7-18)	250	268	498
Test mug 7	10	2 (1-5)	3 (2-5)	5 (4-5)	4 (1-5)	14 (9-18)	300	264	511
Test mug 8	10	2 (1-5)	3 (3-5)	5 (2-5)	4 (1-5)	14 (6-18)	300	347	624
Test mug 9	10	2 (1-5)	3 (3-4)	5 (1-5)	4 (1-5)	14 (8-18)	300	296	583
Test cup 1	10	2 (1-5)	3 (2-3)	4 (2-5)	4 (1-5)	12 (9-18)	150	240*	376*
Test mug 10	6	1 (1-5)	3 (1-5)	4 (2-5)	4 (2-5)	12 (8-17)	250	268	498
Test mug 11	10	3 (1-5)	3 (2-5)	3 (1-4)	4 (1-5)	12 (5-17)	250	342	578
Test mug 12	10	2 (1-5)	4 (3-5)	4 (1-5)	4 (1-5)	12 (4-18)	375	268	633
Double handled mugs									
Test mug 13	10	5 (1-5)	3 (3-4)	5 (2-5)	4 (2-5)	16 (8-18)	200	305	510
Test mug 14	10	5 (1-5)	3 (2-4)	5 (3-5)	3 (1-5)	16 (8-18)	225	300	520
Plastic mugs									
Test mug 15	10	5 (2-5)	3 (3-3)	5 (4-5)	4 (3-5)	17 (15-18)	200	86	305
Test mug 16	10	4 (1-5)	3 (3-4)	4 (2-5)	5 (3-5)	17 (11-18)	250	81	315
Test mug 17	10	5 (1-5)	3 (3-4)	4 (2-5)	4 (1-5)	14 (10-18)	256	111	359
Test mug 18	10	3 (1-5)	3 (2-5)	1 (1-5)	1 (1-5)	8 (5-16)	250	91	338
Tumblers									
Standard tumbler	*37*	*3 (1-5)*	*3 (1-4)*	*5 (2-5)*	*4 (1-5)*	*15 (8-18)*	*150*	*216*	*360*
Test tumbler 1	10	5 (2-5)	3 (3-3)	5 (2-5)	4 (3-5)	17 (12-18)	200	52	252
Test tumbler 2	10	5 (1-5)	3 (3-4)	4 (1-5)	4 (1-5)	14 (9-18)	300	43	327
Beakers									
Standard beaker	*32*	*5 (1-5)*	*3 (2-3)*	*5 (2-5)*	*4 (2-5)*	*16 (11-18)*	*200*	*33*	*227*
Test beaker 1	10	5 (3-5)	3 (3-4)	5 (2-5)	5 (2-5)	16 (13-18)	200	62	268
Test beaker 2	10	3 (1-5)	3 (3-4)	4 (1-5)	4 (1-5)	13 (6-18)	250	58	311
Test beaker 3	10	2 (1-5)	4 (3-5)	4 (2-5)	4 (1-5)	12 (7-16)	325	91	419
Test beaker 4	10	2 (1-5)	4 (3-5)	4 (1-5)	3 (1-5)	11 (4-16)	300	162	457

* plus the weight of the saucer (220g); ‡ volume scoring: far too little (1), a bit too little (2), just right (3), a bit too much (2) far too much (1)

Appendix 12: Data collection tools used in the evaluation phase

Individual observations

Date	Start/stop time	Unit	No of staff on a shift

1. Resident profile

Resident code:	Gender:	Weight: (check records at the end of observation day)	Height: (check records at the end of observation day)

2. Fluids offered

Time	Was this a meal time?	Type of fluid	Staff type offering	Volume offered	Volume consumed	Comments (including reasons for not consuming the whole amount)

2. Fluids offered (cont.)

Time	Was this a meal time?	Type of fluid	Staff type offering	Volume offered	Volume consumed	Comments (including reasons for not consuming the whole amount)

3. Fluids recorded (check records at the end of observation day)

Time recorded	Type recorded	Volume recorded	Additional comments

Hydration-linked events weekly checklist

Date:

Room no	UTI	Other infection	Delirium/acute confusion	Constipation	Fall	Diagnosis of dehydration	Hospital admission	Empty room
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								

Appendix 13: Research outputs

Journal articles:

Wilson, J., Bak, A., Tingle, A., Greene, C., Tsiami, A., Canning, D., Myron, R., Loveday, H. (2018) Improving hydration of care home residents by increasing choice and opportunity to drink: a quality improvement study. *Clinical Nutrition,* [In press)

Greene, C., Canning, D., Wilson, J., Bak, A., Tingle, A., Tsiami, A., Loveday, H. (2018). I-Hydrate training intervention for staff working in a care home setting: an observational study. *Nurse Education Today,* 68. pp61-65

Bak, A., Tsiami, A., Greene, C. (2017) Methods of assessment of hydration status and their usefulness in detecting dehydration in the elderly. *Current Research in Nutrition and Food Science,* 5 (S3).

Bak, A., Tsiami, A. (2016) Review on mechanisms, importance of homeostasis and fluid imbalances in the elderly. *Current Research in Nutrition and Food Science,* 4(S3). pp1-7

Manuscripts under review/in preparation:

Wilson, J., Bak, A., Greene, C., Tingle, A., Tsiami, A., Canning, D., Loveday, H. Exploration of the factors contributing to under-hydration of frail older people in care homes: an observational study.

Bak, A., Wilson, J., Tsiami, A., Loveday, H. Assessing the effectiveness of drinking vessels to increase fluid intake in older care home residents.

Conference presentations:

Bak, A., Wilson, J., Tingle, A., Greene, C., Tsiami, A., Canning, D., Loveday, H. Underhydration of residents in nursing care homes: defining the problem and contributory factors. Poster presentation: 2017 Autumn Meeting of the British Geriatrics Society, London, England, November 2017.

Bak, A., Wilson, J., Tingle, A., Greene, C., Tsiami, A., Canning, D., Loveday, H. An exploration of care home residents' drinking vessels and fluid preferences: promoting

hydration by defining individual needs and preferences. Poster presentation: 2017 Autumn Meeting of the British Geriatrics Society, London, England, November 2017.

Bak, A., Wilson, J., Tingle, A., Greene, C., Tsiami, A., Canning, D., Loveday, H. Improving hydration of care home residents by addressing institutional barriers to fluid consumption – a quality improvement project. Oral presentation presented as a part of a competition for the Young Researcher Award. Hydration for Health Annual conference, Evian, France, July 2017. Abstract published under the same title: *Annals of Nutrition and Metabolism,* 2018; 72 (suppl. 2) 39-44.

The I-Hydrate project: Optimising hydration of elderly residents in nursing homes. Oral presentation: Public Health Wales Infection Prevention Society Conference, Cardiff, Wales, June 2017.

Bak, A., Wilson, J., Tingle, A., Greene, C., Tsiami, A., Canning, D., Loveday, H. I-hydrate: Optimising hydration in elderly care home residents. Poster presentation: Collaboration for Leadership in Applied Health Research and Care Northwest London Winter Meeting, London, England, January 2017.

Bak, A., Tsiami, A., Loveday, H., Wilson, J. Why are care home residents not drinking enough? Oral presentation: Joanna Briggs Institute Annual European Meeting, Madrid, Spain, May 2016.

Other outputs:

Bak, A., Wilson, J., Greene, C., Tingle, A., Tsiami, A., Canning, D., Loveday, H. 2018. I-Hydrate, a final project report.